TECHNOLOGY DEPARTMENT

Telephone ENGINEER and MANAGEMENT

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APRIL 1947

Featuring

SPRING CONSTRUCTION AND MAINTENANCE

•

THE SPRING CONSTRUCTION PROGRAM
By E. C. Burden

•

INSTALLING BUSINESS TELEPHONES
By John S. Reed

•

MODERN TRUCK EQUIPMENT
By John G. Reynolds

•

PRACTICAL "HOW TO DO IT" SUGGESTIONS

•

Editorial on Page 33

•

Contents on Page 4

•

Cover Picture—
... from Mars? . . . No, he's just ... Ohio Bell installer displaying the ... ent of tools and equipment re... to ment all conditions that ... be involved in installing an ... ordinary telephone.

SOMERSET, *Pennsylvania*

The Somerset County Courthouse, erected in Somerset at a cost of over $350,000.

It's maple sugar time in Somerset! You can almost smell the heavy fragrance of that golden liquid, without which, hot cakes just aren't hot cakes.

Each spring as the sap begins to flow from the huge sugar maples attention is focused on Somerset, for this county produces more maple sugar and syrup than all other Pennsylvania counties combined.

In Somerset, *as in more than 1000 other American cities and towns,* telephone directories are published by General Telephone Directory Company.

Our organization has published directories for the Pennsylvania Telephone Corporation, which serves this area, since 1937. During these 9 years that company has been relieved of all details of publication and they have realized substantial increases in gross advertising revenue from directory operations. But that is not all!

In Somerset, as in all other communities we serve, our specialized representatives assume full responsibility for producing accurate, attractive directories and for delivering them to the telephone company promptly.

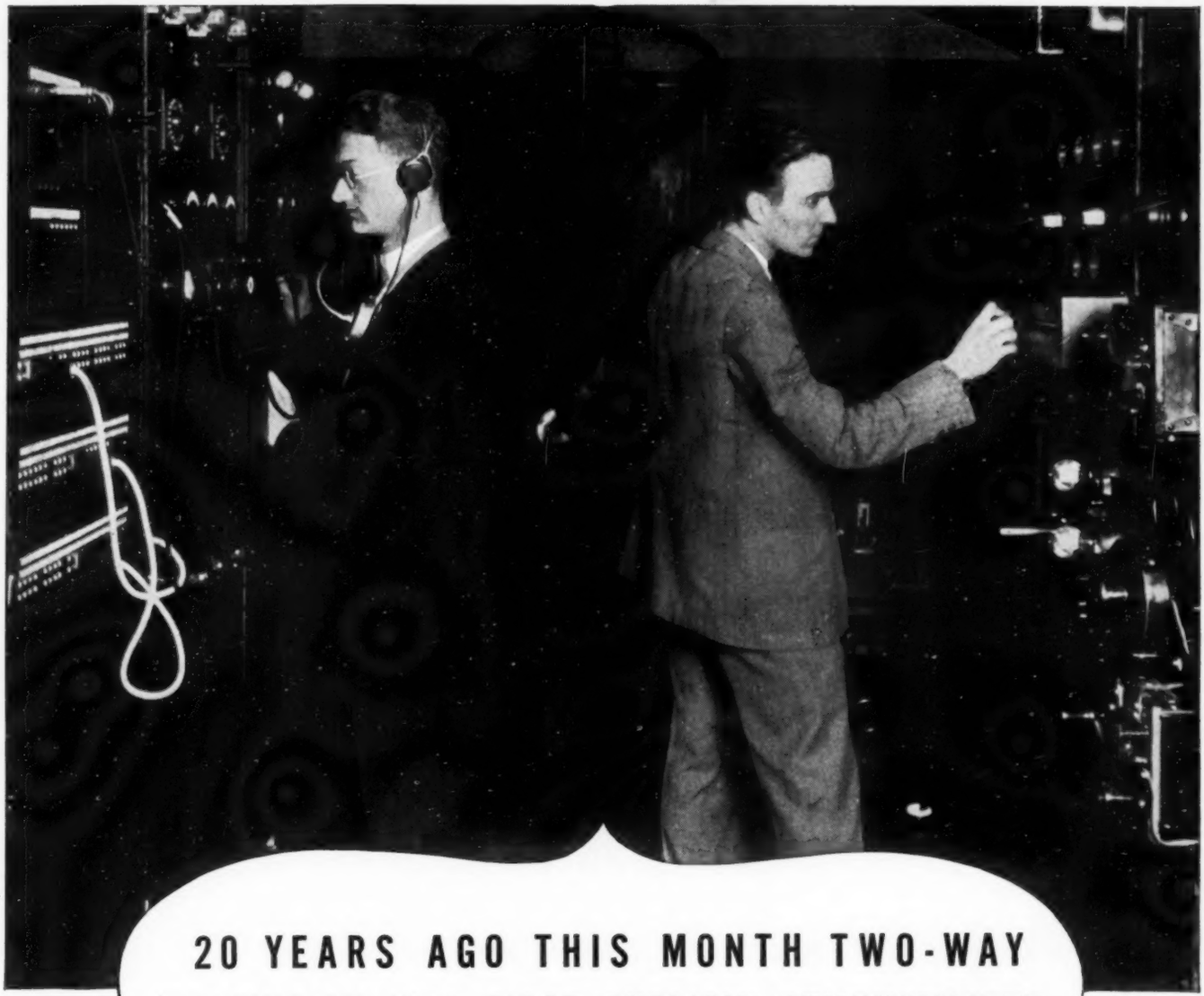
If you contemplate changes in the present directory procedure of your Company and if you desire to be relieved of all details of directory publication including the sale of advertising, making of layouts, proof reading, printing, and preparation for distribution; we shall be glad to provide complete details of our service without obligation.

GENERAL TELEPHONE DIRECTORY COMPANY

Aerial view of the Somerset Interchange on the famed Pennsylvania Turnpike. This beautiful four-lane, divided highway puts Somerset within easy reach of either Pitts-

EASTERN OFFICE: 185 NORTH WABASH AVENUE, CHICAGO 1, ILLINOIS, TELEPHONE STATE 5478

WESTERN OFFICE: PRESS-TELEGRAM BUILDING, LONG BEACH 12, CALIFORNIA, TELEPHONE 672-22



20 YEARS AGO THIS MONTH TWO-WAY TELEVISION WAS FIRST PUBLICLY DEMONSTRATED

On April 7, 1927, leaders in science, industry and public affairs gathered in Washington, D.C. and New York City to see a demonstration of one of the new wonders of the world . . . television. This two-way visual conversation was conducted over telephone circuits and under the direction of telephone engineers.

The telephone industry has contributed much toward the development of television, just as it has done with teletypewriting, telephotography and many other modern electrical marvels. All are a part of the telephone *Spirit of Service* . . . in keeping with the tradition of faithfulness and dependability.

In Exide Batteries you will find the same dependability for which American telephone service is famous throughout the world. Since 1895, Exide Batteries have been proving themselves worthy of that trust.

Exide
BATTERIES

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32 • Exide Batteries of Canada, Limited, Toronto

IT SEEMS TO US

If your next letter from Texas Creosoting Company is written with pen or pencil instead of by typewriter you will know that Mr. D. E. ROACH is using the lovely set presented to him in appreciation of his efforts towards making the Monterrey, Mexico trip of visitors to the Texas Convention a most pleasant one. MRS. DAN McNULTY of Chicago made the presentation on the train bringing the trippers and donors back to the states.

• • •

KEN GILLETTE, Automatic's Supply Sales Manager, might make Life magazine . . . He kept his camera busy on the Monterrey invasion by telephone men . . . with the result that everyone who came in range of his lens are eagerly awaiting developments.

• • •

The ROBBS of Electra, Texas again carried off honors by having the largest family registration at the Texas Convention. MR AND MRS. A. L. ROBB together with son "Dink" and his wife and daughter ably represented the Electra Telephone Company.

• • •

GEORGE BUTLER, formerly Executive Secretary of the Texas Telephone Association and now with the Texas State Insurance Department made a hit with the natives at the annual banquet. As JACK HALEY finished introducing about 20 out-of-state visitors seated at the speakers table, George arose and asked "Ain't there nobody here from Texas?"

• • •

MRS. WINEMILLER, wife of Stromberg-Carlson's "PETE" WINEMILLER is quite proud of her son. She describes him as follows: "He was christened General Pershing Winemiller, is a Colonel in the Reserve Air Force, a Captain with T. W. A. and is First Class with his mother and everyone else who knows him."

The National Telephone Magazine

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TELEPHONE ENGINEER and MANAGEMENT

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APRIL, 1947

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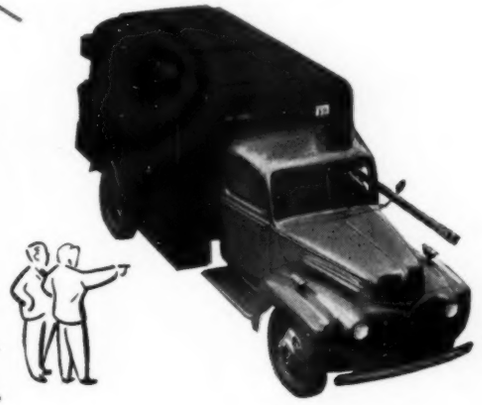
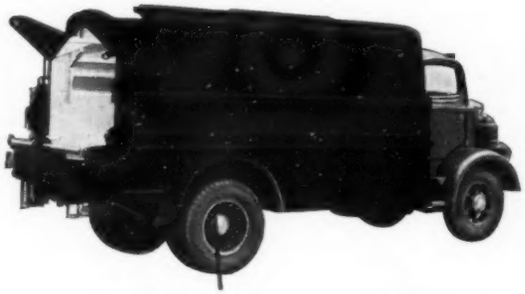
When is a special Truck Body STANDARD?

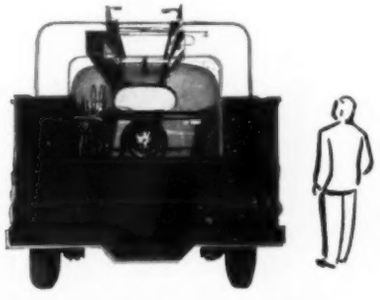
An American line construction body represents a cross section of the needs of utilities. We incorporate the experience of many, many users, supplemented by our own observations and field studies. As a result, American DPL, B-4, 4551, 4460-L, and other line construction bodies have become standard with utilities.

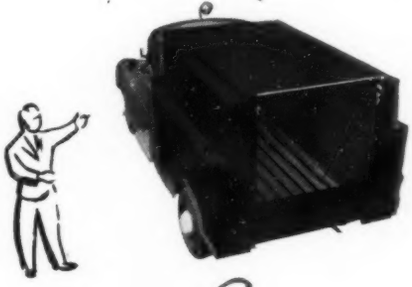




Proper design aids this production standardization. Standard parts and assemblies facilitate mass production . . . they permit easy maintenance. Gadgets and trick features purposely have been left out. Yet American bodies have a place for everything needed on the job.

Consider the American DPL Line Construction Body. This design has 17 specific construction features, many standard units (such as derrick tunnel) and choice of more than 60 optional equipment items.





Standardization helps you keep your operating costs low. The American Coach and Body Company, largest manufacturers of utility truck bodies, will continue the intelligent application of efficient standardization.

THE *American* COACH and BODY COMPANY

9503 WOODLAND AVE., CLEVELAND 4, OHIO

SALES and ASSEMBLY THE AMERICAN COACH AND BODY CO. OF CALIF., 432 FIFTH ST., OAKLAND 7, CALIF.
BAKER EQUIPMENT ENGINEERING CO., SUMMIT & NORFOLK STS., RICHMOND 11, VA.

OFFICES 350 MADISON AVE., NEW YORK 17, N. Y. INSURANCE EXCHANGE BLDG., DES MOINES 9, IOWA

ACB and

PRECISION timing of toll calls as done with Calculagraphs, is not only used by domestic telephone systems but is popular throughout the world.

Calculagraph uses the universal measurement of time—minutes and seconds—and requires no translation or conversion table to be used in any country.

Whether called minutos y horas, minuter och timmar, or just plain minutes and seconds, this data is printed accurately and dependably with Calculagraphs without computation at the end of a call.

CALCULAGRAPH COMPANY

310 SUSSEX STREET • HARRISON, NEW JERSEY

Amcreco poles

are not ashamed of their age!

they're

Branded

for life

When you see the Amcreco brand, check the figures which appear in the shield. They represent the last two digits of the year the pole was treated. Then examine the condition of the pole. You'll find conclusive evidence of the dependability and long life of Amcreco full length, pressure treated, creosoted poles. Write for detailed information on actual service records today.

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LOWRY PROCESS
Creosoted
products

POLES
CROSSARMS • CONDUIT • PLANKING

AMERICAN CREOSOTING COMPANY
INCORPORATED

COLONIAL CREOSOTING COMPANY INCORPORATED

AMCREO LOWRY PROCESS CREOSOTED WOOD

GEORGIA CREOSOTING COMPANY INCORPORATED

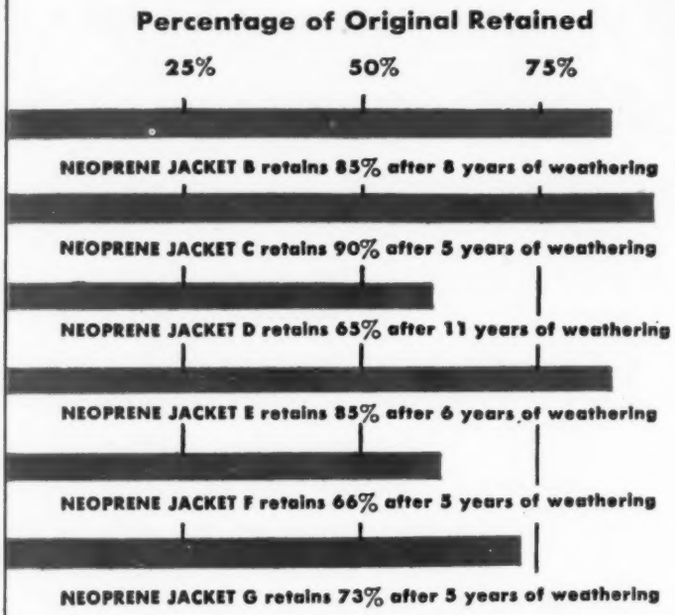
ADDRESS INQUIRIES TO CHICAGO, ILL., OR LOUISVILLE, KY.

Pressure treated for strength that lasts!

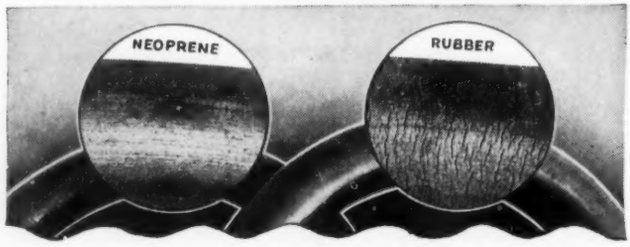
Field Tests Show Long Outdoor Life for Wire and Cable Jackets of

TOUGH, DURABLE NEOPRENE

How ELONGATION AT BREAK is retained after years of exposure to sunlight and weather...


Percentage of Original Retained
25%
50%
75%
NEOPRENE JACKET B retains 85% after 8 years of weathering
NEOPRENE JACKET C retains 90% after 5 years of weathering
NEOPRENE JACKET D retains 65% after 11 years of weathering
NEOPRENE JACKET E retains 85% after 6 years of weathering
NEOPRENE JACKET F retains 66% after 5 years of weathering
NEOPRENE JACKET G retains 73% after 5 years of weathering

Unretouched photos after 10-year test



Elongation at break is a characteristic which is closely observed when testing wire and cable jackets by exposure to sunlight and weather. Severe losses in this property are one sign of approaching disintegration of the jacket. The very fact that elongation at break can be measured for these neoprene jackets after years of exposure to sunlight and weather is in itself significant. It proves that there are no deep cracks in the jackets. By contrast, the rubber jacket shown above was so badly cracked after a few years exposure that no elongation tests could be made. Such cracks in cable jackets mean the easily damaged insulation beneath is exposed to sunlight, weather, rain, and ice.

Look to neoprene for longer life and better protection for wire insulation—in jackets and sheaths for drop wire, riser cables, power cables and many other types of wire and cable to be used outdoors.

Neoprene also gives excellent resistance to abrasion and wear, to acid fumes and smoke, to ozone and oxidation. Get the maximum return for your investment in years to come. Specify neoprene jackets and sheaths.

Here's Why Neoprene DOES SO MANY JOBS SO WELL!

- ★ High tensile strength, resilience, low permanent distortion.
- ★ Tough and durable, resists abrasion and cutting.
- ★ Superior resistance to sunlight, aging, ozone, and heat.
- ★ Resistance to deterioration by oils, solvents, chemicals, acids.
- ★ Superior air-retention, low permeability to gases and fluids.
- ★ Special compositions are flame-retarding, static-conducting, flexible at low temperatures.

Write for *your free subscription to The Neoprene Notebook. Packed with information about new or unusual neoprene applications—which may give you valuable new ideas. Back issues on request. Rubber Chemicals Division M-4, E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware.*

For Better Equipment, Specify

DU PONT NEOPRENE

The* VERSATILE *Synthetic Rubber

BETTER THINGS FOR BETTER LIVING
. . . *THROUGH CHEMISTRY*

DU PONT
REG. U. S. PAT. OFF.

ON OUR PARTY LINE

•

THANKS! THANKS! . . .

OUR MARCH 15 issue of TELEPHONE ENGINEER & MANAGEMENT caused so many of you grand subscribers to write in that it would fill up all of our space just to reproduce the letters. We're glad you liked the issue and want to THANK YOU for taking time out to write and tell us about it. Slowly but surely we're getting the many letters acknowledged—and we hope the same flood of mail hits us many times in the future.

• • •

MAN AT THE BOARD . . .

SUBSCRIBERS of Michigan Bell's Sault Ste. Marie exchange recently received a surprise when they lifted a telephone and a masculine voice inquired, "Number, Please?"

Reaction of nine out of ten subscribers was—"Jeeps, it's a man on the phone!"

Reason for the surprise was Bill Sincook, in training as traffic manager, and learning the business from the ground up.

• • •

NO HOLE IN THE WIRE . . .

FROM OUT Alberta, Canada, way, comes this story of the installer and the farmer. The farmer came home while the telephone was being installed. He picked up the wire and looked at its end, scratching it as he made his investigation. Finally he said, "I don't see no hole in this wire!"

"No," said the installer, "it hasn't got any hole in it."

The farmer drew back in amazement.

"Do you mean to tell me," he asked, "that people can talk through this wire without a hole in it??"

• • •

FISH TROUBLE . . .

TELEPHONE trouble shooters checking a dead line west of Livingston, Montana, found a sizeable fish lying across two wires and "shorting" them out. Since flying fish are not common to Montana, the blame was laid to an osprey, or some other fish-catching bird.

FOR YOUR CONSIDERATION

PINS FOR TELEPHONE CONSTRUCTION

The ever popular Hubbard Telephone Pins are styled to fit every telephone construction need. The drop forged pin bodies have clean, rolled threads and are heavily galvanized for protection against corrosion. Great care is taken in preparing the wood cobs which are properly seasoned, air dried and thoroughly impregnated with paraffin.

†*No. 8005 †No. 8011 †*No. 8010

† A. T. & T. COMPANY STANDARD * WESTERN UNION STANDARD

ALSO—POLE LINE HARDWARE FOR ALL TELEPHONE CONSTRUCTION REQUIREMENTS

ANCHORS, PLATE AND SCREW* BRACES* BRACKETS, POLE, CORNER AND HOUSE* CABLE SUSPENSION HARDWARE* CARRIAGE BOLTS CROSS ARM BOLTS* CABLE RACKS* CABLE SHIELDS* DRIVE HOOKS EXTENSION ARMS * EYE BOLTS-HUBEYE * GRADE CLAMPS * GUY CLAMPS* GROUND RODS* GUYING ACCESSORIES* GUY PROTECTORS GUY HOOKS * HUBEYE NUTS * HUBEYE BOLTS * LAG SCREWS MESSENGER DEAD ENDS* MACHINE BOLTS* MANHOLE LADDERS POLE SEATS* POLE BALCONIES* PINS* POLE STRUTS* POLE STEPS STUBBING BANDS* STRAIN PLATES* STORM GUY ATTACHMENTS SIDE-WALK GUYS* SPAN CLAMPS* TRANSPOSITION BRACKETS

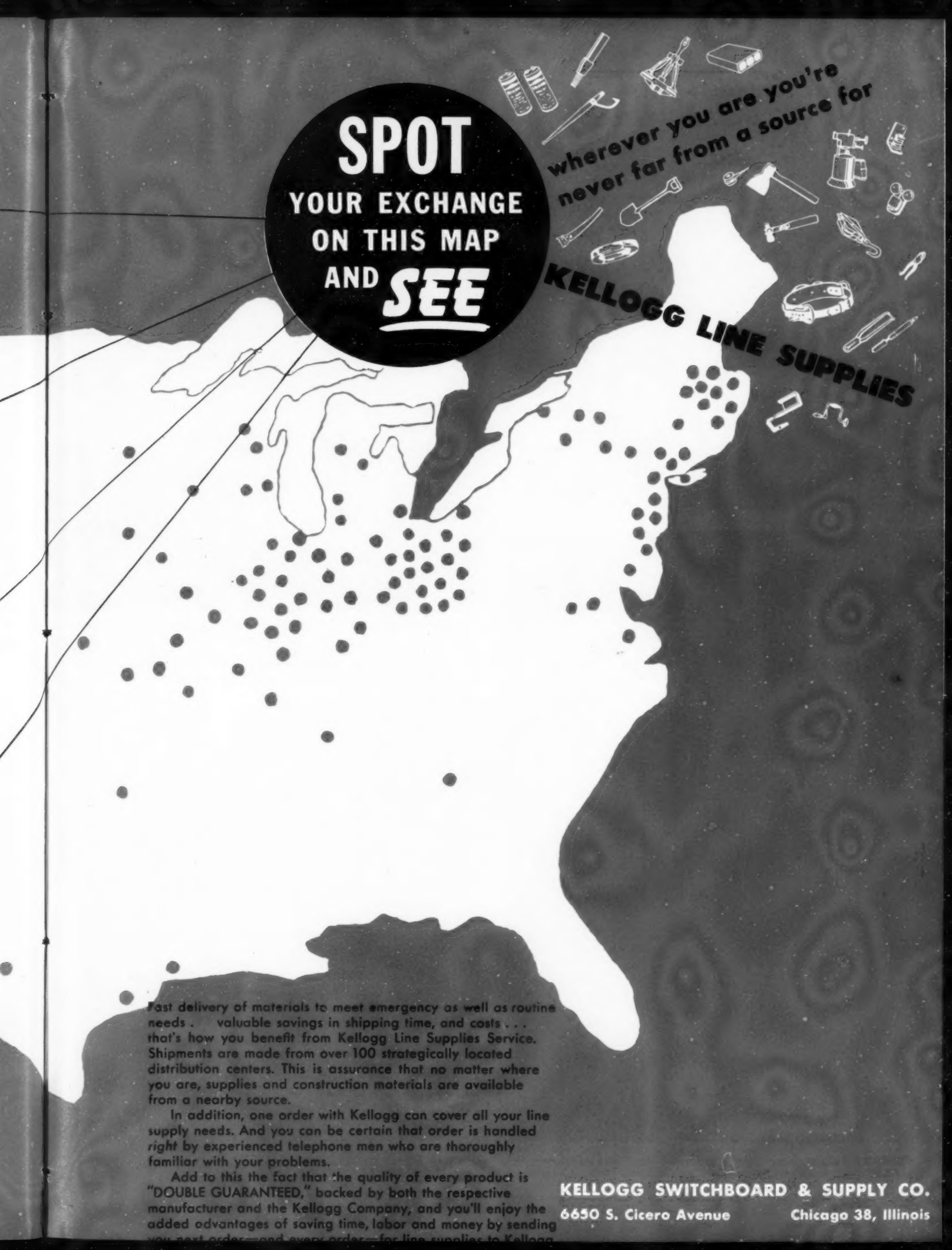
"HANG THE LOAD ON HUBBARD HARDWARE"

HUBBARD AND COMPANY

ESTABLISHED 1843

PITTSBURGH . . . CHICAGO . . . OAKLAND, CALIFORNIA

CONSTRUCTION MATERIAL
Anchors: Guy, Nail and Screw
Bolts: Carriage, Machine and Lag
Braces: Crossarm, Back and Angle
Brackets: House, Pole and Transposition
Cable: Telephone and Switchboard
Clamps: Guy, Span and Cable
Conduit: Clay, Fibre and Wood
Clips: Guy, Drop Wire and Test
Crossarms: Creosoted Pine and Douglas Fir
Guards: Cable, Manhole and Tool
CONSTRUCTION MATERIAL
Grips: Drop Wire, Line-Wire and Strand
Insulators: Glass, Porcelain and Rubber
Kits: First Aid and Tool
Knobs: Porcelain and Knob Racks
Ladders: Extension, Step and Platform
Manhole Covers, Frame and Guards
Nails: Galvanized and Pole Dating
Poles: Creosoted Pine, Northern and Western Cedar
Rings: Bridle, Cable and Drive
Rods: Anchor, Duct and Ground
TOOLS
Augers and Blow Torches
Bolt Cutters and Digging Bars
Jacks: Cable and Pole
Linemen's Belts, Climbers and Straps
Pike Poles, Pliers and Pulleys
Screw Drivers and Soldering Irons
Tool Bags and Tool Kits
Tree Trimmers and Wrenches
WIRE
Drop Kellogg Bronze, Copper and Iron
High Tensile Line
Bridle and Tree
Jumper and Interior
Lashing and Bonding
Steel Strand
POWER AND PROTECTION
Arresters and Arrester Carbons
Arrester Blocks and Arrester Clips
Batteries: Storage and Dry Cells
Fuse Wire: Bronze and Copper
Fuses for Arresters and Cable
Rectifiers • Rectifilters
Ringing Machines • Terminals
Terminals: Cable and Terminal Boxes



Fast delivery of materials to meet emergency as well as routine needs . valuable savings in shipping time, and costs . . . that's how you benefit from Kellogg Line Supplies Service. Shipments are made from over 100 strategically located distribution centers. This is assurance that no matter where you are, supplies and construction materials are available from a nearby source.

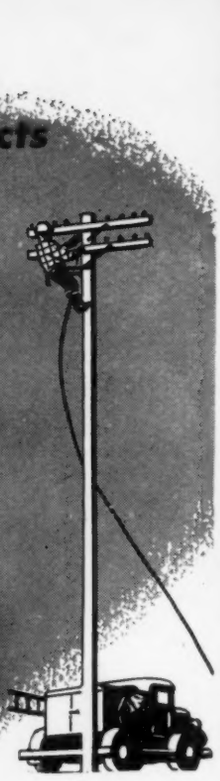
In addition, one order with Kellogg can cover all your line supply needs. And you can be certain that order is handled *right* by experienced telephone men who are thoroughly familiar with your problems.

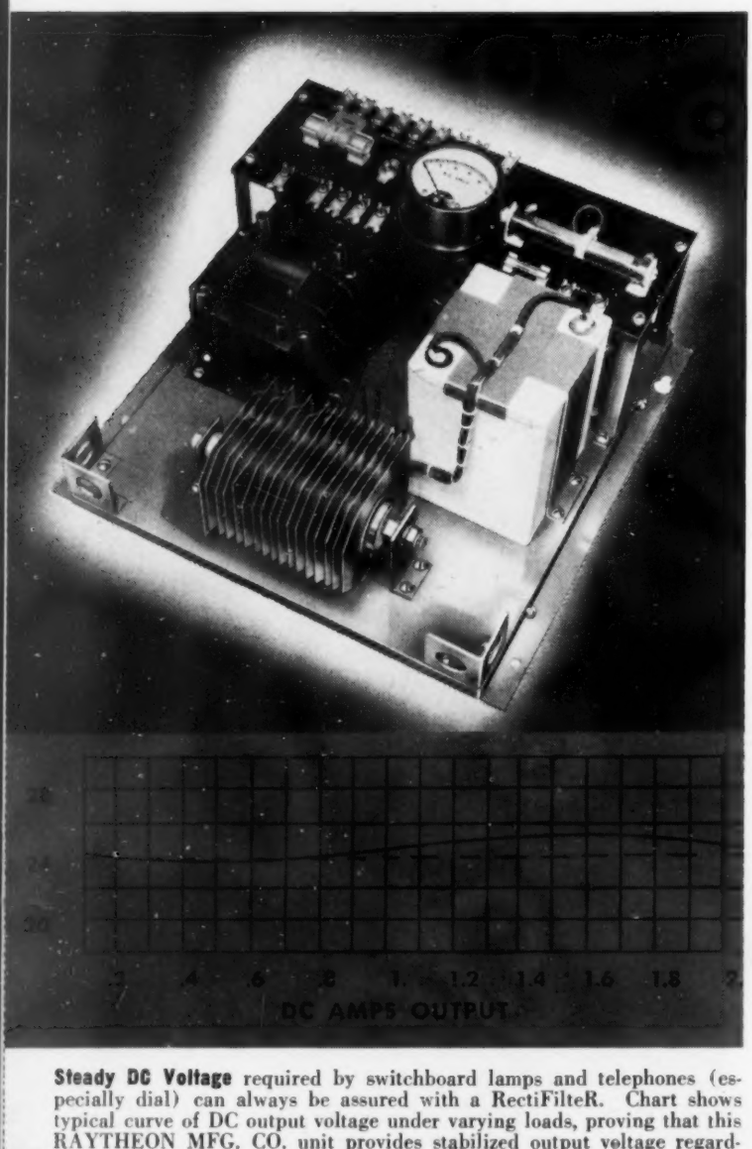
Add to this the fact that the quality of every product is "DOUBLE GUARANTEED," backed by both the respective manufacturer and the Kellogg Company, and you'll enjoy the added advantages of saving time, labor and money by sending you next order—and every order—for line supplies to Kellogg

KELLOGG SWITCHBOARD & SUPPLY CO.
6650 S. Cicero Avenue Chicago 38, Illinois

The Satisfaction Lasts
When You Buy Products

Recommended and Guaranteed by **KELLOGG**





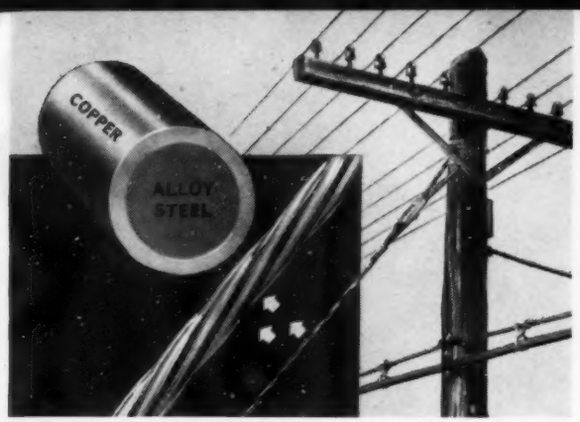
Steady DC Voltage required by switchboard lamps and telephones (especially dial) can always be assured with a RectiFilteR. Chart shows typical curve of DC output voltage under varying loads, proving that this RAYTHEON MFG. CO. unit provides stabilized output voltage regardless of AC variations. With no moving parts, maintenance is very low.

Telephone Engineers Specify Philco Floté Storage Batteries for today's full float service. This is the only battery with special engineering, special construction and special high-efficiency grid material for full float service conditions. With PHILCO Floté on the job, low cells are eliminated, maintenance and charging costs are lower, batteries last longer.

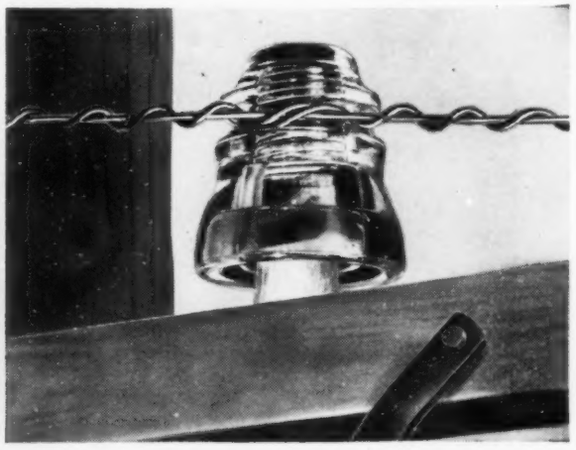
There's three-way satisfaction when you concentrate purchases of line supply and constuction materials at a single, responsible source: (1) The *quality* is right—all products are backed by the famous Kellogg DOUBLE GUARANTEE; (2) The service is right—orders are intelligently handled by experienced people; (3) *Delivery* is right—orders are shipped from the nearest of over 100 strategically located distribution points.

KELLOGG SWITCHBOARD & SUPPLY COMPANY
Branch Offices: Kansas City, San Francisco, St. Paul, Los Angeles
Factory and General Offices: 6650 S. Cicero Avenue, Chicago 38

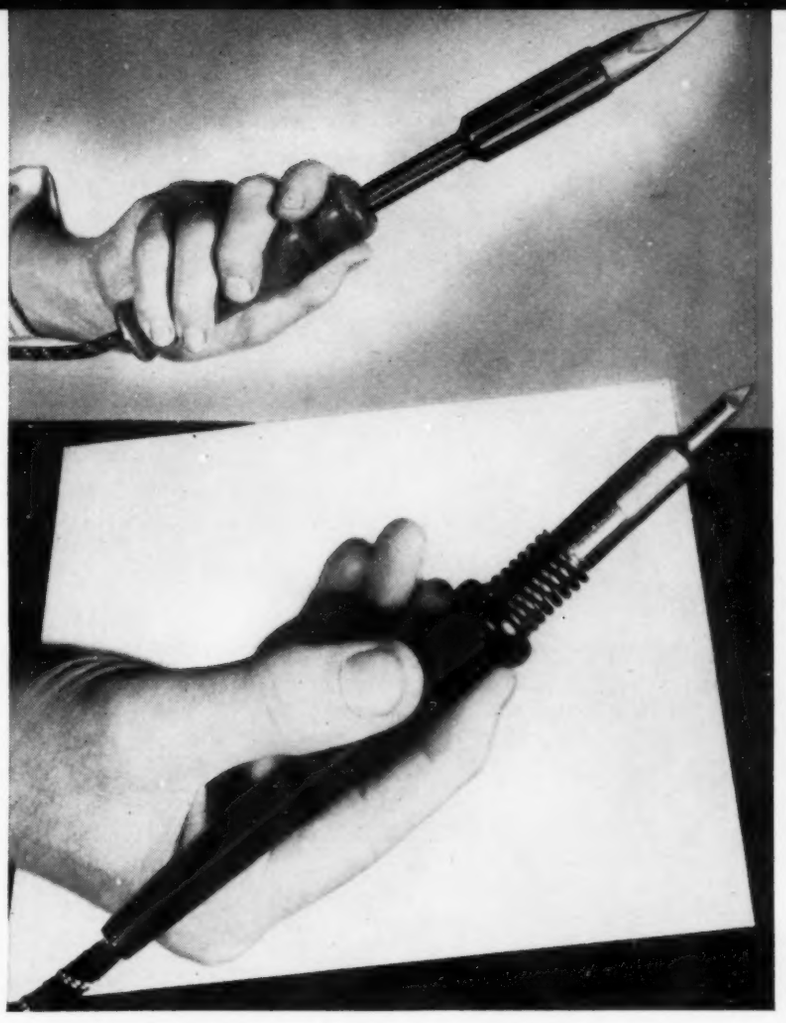
For Service from a Nearby Distribution Point
Order Your Line Supplies from
KELLOGG



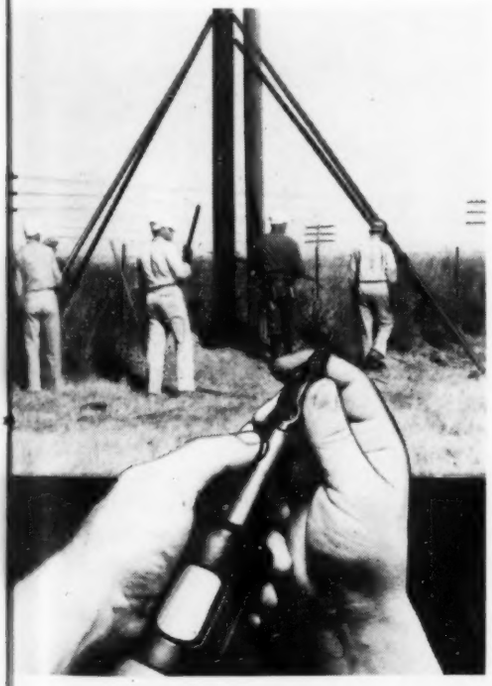
Strength Plus Life. Choose Copperweld Guy and Messenger Strand for the ideal combination of high breaking strength plus long life. Each wire of this COPPERWELD STEEL CO. product has a thick protective covering of copper *permanently* molten-welded to an alloy steel core.



Meet Every Service Need. That's why so many telephone companies use Armstrong Glass Insulators. Made by ARMSTRONG CORK COMPANY, they feature crystal clarity of glass, accurate gauging and unusual resistance to temperature changes. A good bet for reducing maintenance.

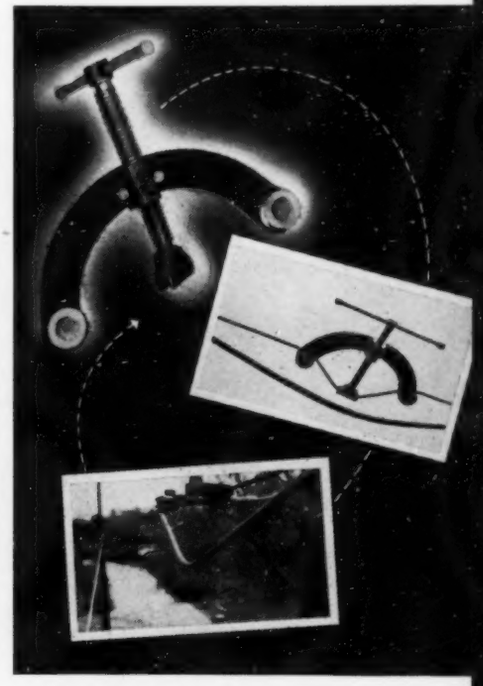


Neat Precision Soldering is easy when you use a Vulcan Electric Soldering Iron. The high powered heating element assures a long life of unimpaired heat production. These VULCAN ELECTRIC CO. irons come in 15 sizes of screw and plug tip types—including the "Pygmy" tool, shown at top, for delicate soldering in cramped spaces. Hard forged, pure copper tips are easily replaceable.



Safety First! Chance Safety Pike Poles are preferred by so many Telephone men because of their design, safety and dependability. Removable points can be inserted into the ferrule, point first, for carrying. The spiral point holds without slipping. Made by A. B. CHANCE CO.

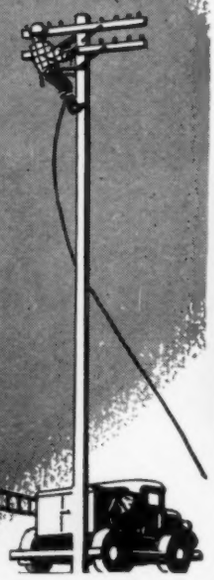
It's a Snap to make neat installations with Rhodes Telephone Wiring Nails according to independent telephone men who use them exclusively. M. M. RHODES & SONS maintain the uniform high quality of these nails by putting them through rigid driving, withdrawing, bending and immersion tests.

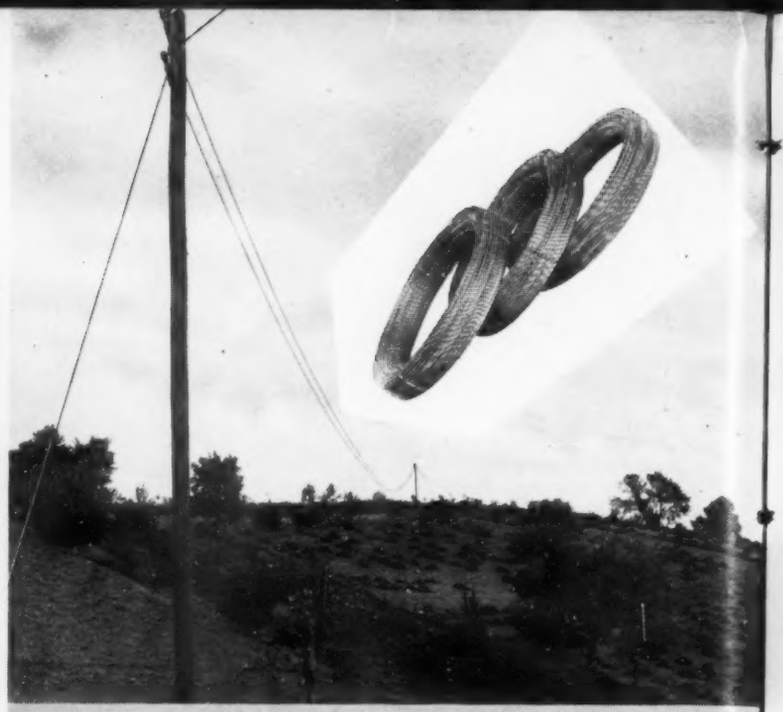


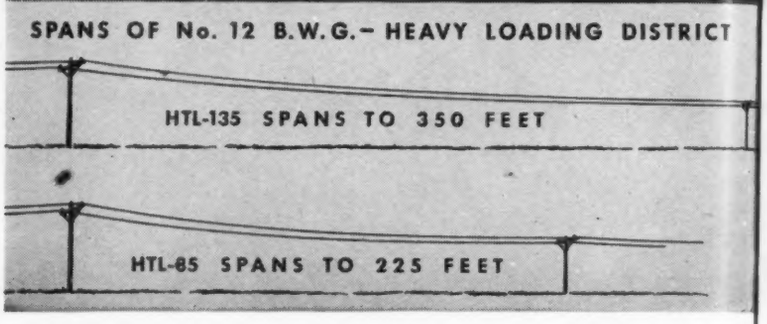
Time and Labor Saver. The "Little Giant" Slack Puller is ideal for taking up and holding slack in spun messenger strand and cable before cable is repaired—cuts insulation damage caused by working on tight cables. Made by CABLE SPINNING EQUIPMENT CO.

The Satisfaction Lasts When You Buy Products

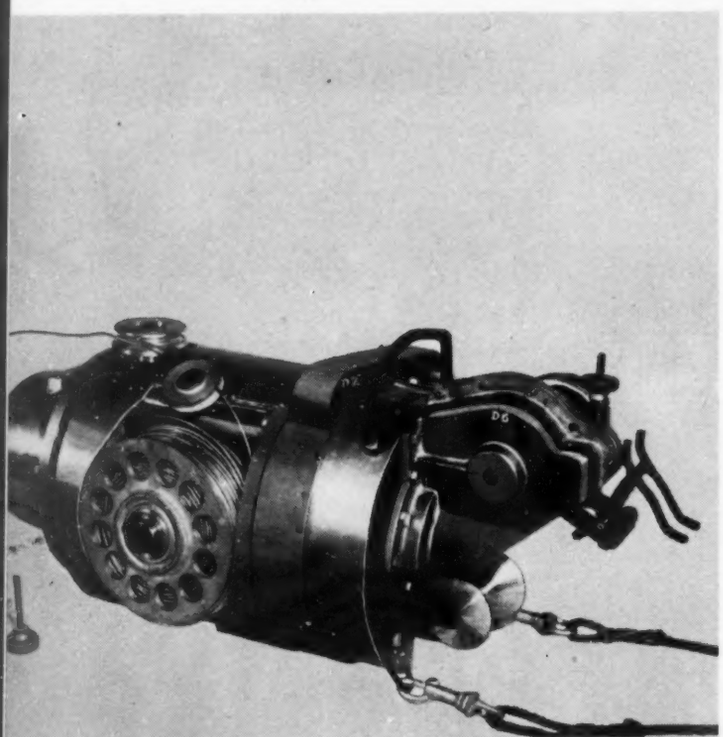
Recommended and Guaranteed by KELLOGG







Save Two Ways on line wire replacement and construction by standardizing on INDIANA STEEL AND WIRE COMPANY'S Crapo HTL-135 and Crapo HTL-85 Line Wire. Because of their high tensile strength, these wires permit long spans, enable you to realize substantial savings in construction costs. Galvanized by the famous Crapo Galvanizing Process.



Lower Costs On New Construction! The Model "D" Neale Cable Spinner made by the CABLE SPINNING EQUIPMENT COMPANY, operates smoothly under all conditions. Double-drive mechanism insures evenly spaced spirals, spun under steady tension. Ratchet lock holds the spinner in place on strand whenever pull on tow line is released.

There's three-way satisfaction when you concentrate purchases of line supply and constuction materials at a single, responsible source: (1) The *quality* is right—all products are backed by the famous Kellogg DOUBLE GUARANTEE; (2) The service is right—orders are intelligently handled by experienced people; (3) *Delivery* is right—orders are shipped from the nearest of over 100 strategically located distribution points.

KELLOGG SWITCHBOARD & SUPPLY COMPANY

Branch Offices: Kansas City, San Francisco, St. Paul, Los Angeles

Factory and General Offices: 6650 S. Cicero Avenue, Chicago 38

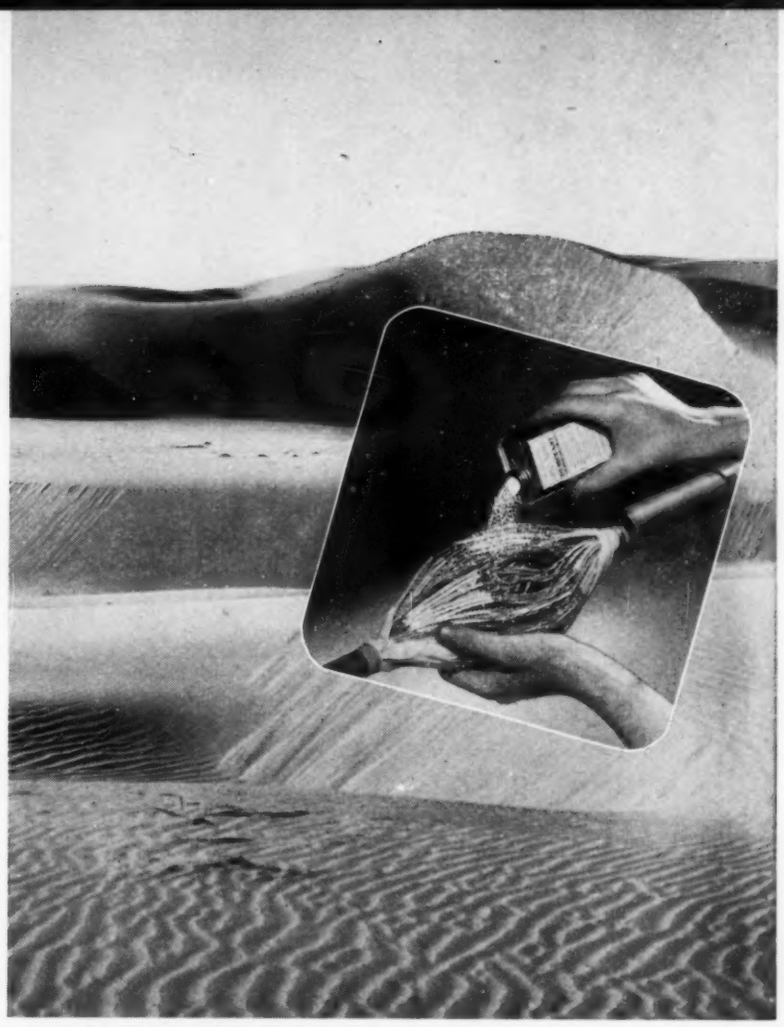
For Service from a Nearby Distribution Point

Order Your Line Supplies from

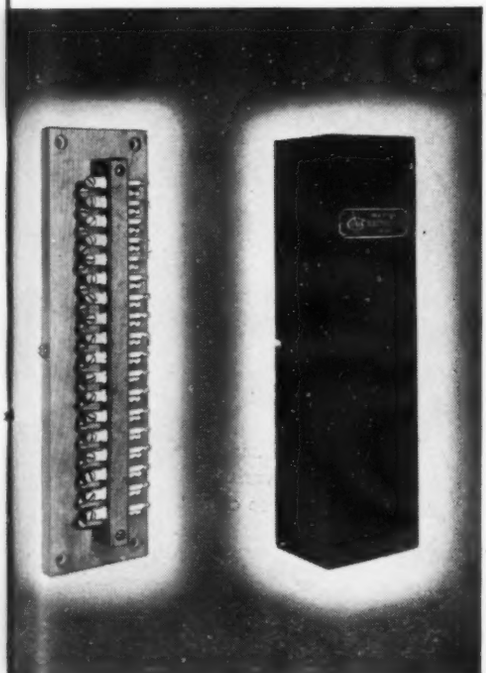
KELLOGG

You Can Reduce Replacements when you use "Eveready", "Columbia" "Gray Label" Telephone Cells. Products of the world's largest dry battery laboratory at NATIONAL CARBON CO., INC., they are famous for sustained voltage, extra hours of service life and uniform high quality.

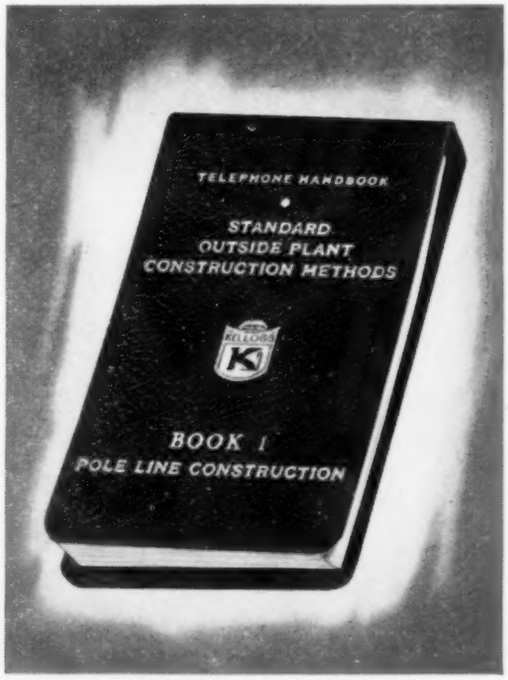
Long Life Expectancy is built into pressure-treated Southern Pine Poles and Crossarms. Carefully and thoroughly treated by the AMERICAN CREOSOTE WORKS, INC., these poles have the extra durability required for dependable service under the toughest climatic conditions.



Drier than The Driest Desert! Drierite Desiccant is the safer, better way of drying out splices in lead covered cables. After splicing it, all you need do is bind a cotton gauze under the splice and sprinkle Drierite granules in among the conductors. This W. A. HAMMOND DRIERITE CO. product readily absorbs all moisture, making the splice about the driest part of the entire cable line.



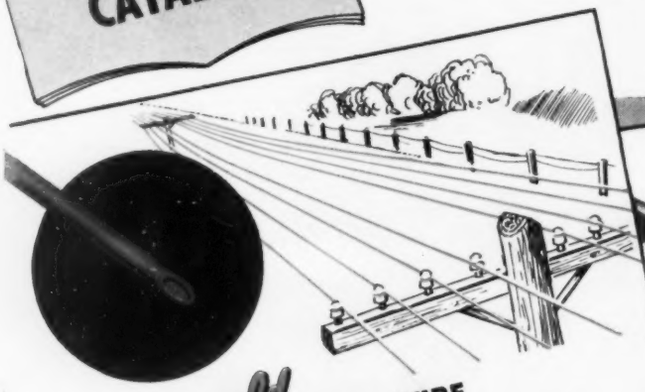
The Practical Economical Way of providing screw connections for wire distribution in P.B.X. units and small exchanges is with the Cook Type 54 Interior Junction Box. This COOK ELECTRIC CO. unit is also used for floor cable distribution in factories and offices.



Packed With Valuable Information! Here's a helpful new handbook for field men—loaded with valuable "tips" on outside plant maintenance and pole line construction. Durably bound, it contains 364 profusely illustrated pages. Pocket size for ready, on-the-job reference. Order from KELLOGG.

Increase Drop Wire Life 30% by using GENERAL INSULATED WIRE WORKS Bronze Drop Wire. This high-conductivity wire is drawn of solid non-corrosive bronze and covered with special "armoured" insulation for lasting protection. Very easy to work with.

VEST POCKET CATALOG OF DEPENDABLE Copperweld PRODUCTS FOR THE TELEPHONE INDUSTRY

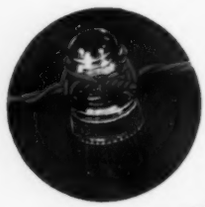


Copperweld

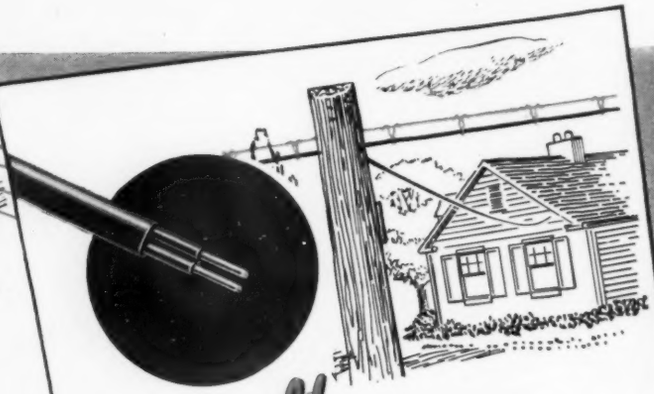
LINE WIRE

The ideal wire for long-lasting line construction—light in weight—small in diameter—easy to string—non-rusting—safe for long spans—has high conductance and excellent voice and high frequency characteristics. Made by Copperweld's exclusive molten-welding process in which a thick covering of non-rusting copper is permanently welded to a core of high strength alloy steel.

GRIP-FLEX 38 TIES



Simple in design and easy to apply. This high strength tie assures uniformity in construction. It eliminates the more common faults of hand-wrapped ties, which have resulted in chafing and fatigue fracturing of conductors.



Copperweld

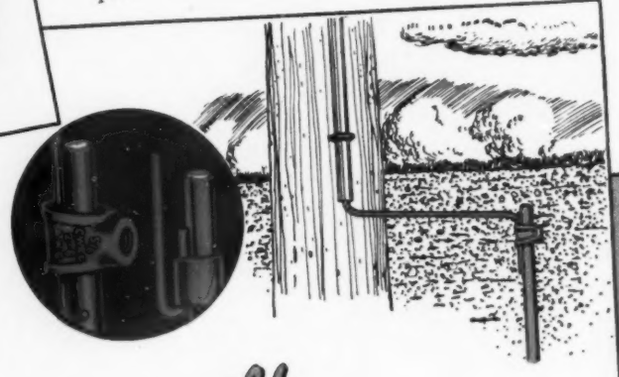
DROP WIRE

The strongest drop wire made, with the stamina necessary to combat heavy ice and wind loads. The high strength alloy steel core resists excessive sagging under external loads. No. 17 AWG Copperweld parallel or twisted pair drop wire has a guaranteed breaking strength of 400 pounds, No. 18-340 pounds.

Copperweld

GUY AND MESSENGER STRAND

Buy Copperweld Strand to the exact strength you need—it is not necessary to provide excess strength as insurance against rusting. Copperweld can't rust because the high strength steel core is permanently protected by a thick covering of copper which will not crack, peel or flake.



Copperweld

GROUND RODS AND CLAMPS

By using Copperweld Ground Rods and Clamps, corrosion and high resistance contacts are eliminated. All contacts are copper-to-copper. The stiff steel core insures easy driving and is permanently protected from rusting by a thick covering of copper. This rod, with a rugged one-piece clamp, makes a simple and dependable ground connection.

For the Best in Telephone Products use Copperweld SOLD BY LEADING DISTRIBUTORS

COPPERWELD STEEL COMPANY GLASSPORT, PA.

SALES OFFICES IN PRINCIPAL CITIES

4 Big Reasons

WHY YOU SHOULD BUY CONSTRUCTION AND MAINTENANCE SUPPLIES FROM STROMBERG-CARLSON

SINGLE SOURCE ORDERING SAVES TIME AND EFFORT
By concentrating supply purchases with Stromberg-Carlson, you will cut ordering time and effort to a minimum.

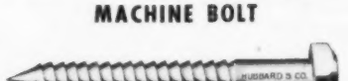
FAST, NATION-WIDE SERVICE
Because Stromberg-Carlson has stock depots located strategically from coast to coast, you are assured of faster, better delivery service.

EVERY ITEM QUALITY-TESTED
Stromberg-Carlson will not sell any item that fails to meet the company's rigid tests for high quality and dependable performance.

DOUBLE WARRANTY
Back of every supply item is not only the manufacturer's warranty, but also the warranty of Stromberg-Carlson—respected by the industry for more than 53 years.

STROMBERG Telephone CARLSON

MACHINE BOLT



LAG SCREW

STROMBERG-CARLSON *Recommends:*

HEMINGRAY NO. 9 INSULATOR

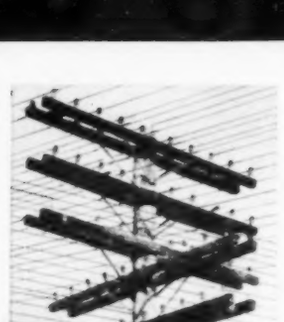
The exchange line pony. Standard on many telephone lines.

HEMINGRAY NO. 42 INSULATOR

Standard for years. Its long leakage path keeps toll lines trouble-free.

HEMINGRAY NO. 12 INSULATOR

Double groove pony provides substantial support for line wire.



FIR CROSSARMS

COMPLETE LINE OF CABLE

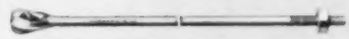
COOK TYPE RO OUTDOOR SUB-STATION PROTECTOR

A very rugged Protector, assembled on a bracket of heavy steel to take rough handling and subscriber abuse without danger of breakage.

COOK TYPE S-20 POLE CABLE TERMINAL

Offers maximum convenience, performance and economy. Can be used as a protected or unprotected terminal. Made in 6, 11, 16 or 26 pair capacity.

HTL-85 IRON WIRE



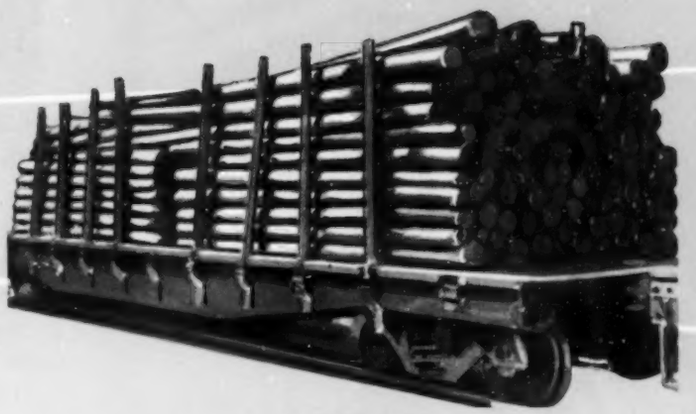
HUBEYE ANCHOR RODS

SQUARE WASHERS

HUBEYE BOLTS

CARRIAGE BOLT

CROSSARM BRACES

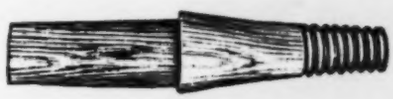


PINE POLES

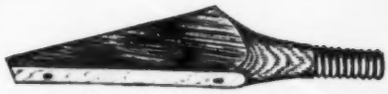
Prepared by the Rueping Process, which literally pumps creosote oil into the wood cells to combat nature's attacks, these pine poles will give long, reliable service.

NICOPRESS NO. 12 BWG SLEEVES

NICOPRESS NO. 17 B & S SLEEVES



1¼" x 8" WOOD PINS



WESTERN UNION 2" x 2⅜" x 12" OAK BRACKETS

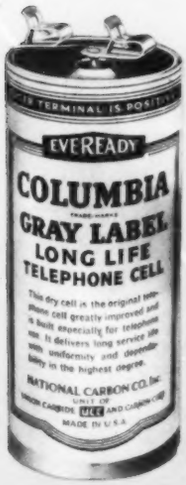
FRICTION TAPE

NICOPRESS NO. 31-DC

Nicopress splices will withstand the toughest strains of vibration and have a high and lasting conductivity.

NICOPRESS NO. 17-2

Convenient and practical to handle in the air or on the ground. Linemen can be sure that the applied pressure will give the exact compression needed.

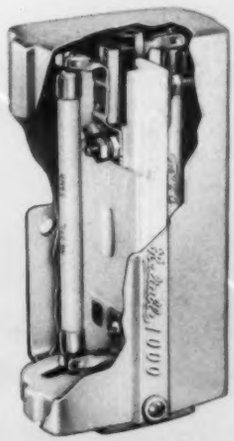


"EVEREADY" "COLUMBIA" "GRAY LABEL"

Give higher sustained voltage, longer life. Built by makers of famous "Air Cell" Operators' Transmitter Batteries.

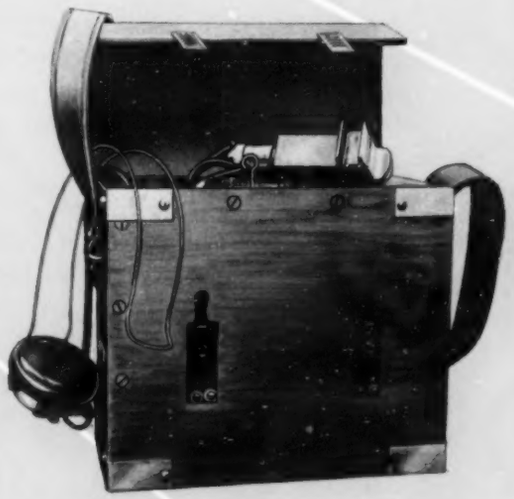
RELIABLE RU POLE CABLE TERMINAL

Simple and rugged in construction, reversible, weatherproof. Capacities 6 to 26 pair.



RELIABLE TYPE 1000-H ARRESTOR

Self-cleaning Discharge Blocks dissipate static. No time lag, no grounding, no carbon deposits. Everdur Binding Posts, bronze fuse clips and carbon springs. Weatherproof cover.



STEWART TEST SETS

Tells which way and how far the trouble is from you without opening the line. Includes a complete telephone circuit for ringing and talking. Trouble is located by means of a detector coil.

Sturgis Metal Chairs

Scientific design and almost unlimited capacity for adjustment in height and depth to correctly posture operators of every type and figure are the reasons why this No. 435-A Sturgis chair is the standard for comfort. Fitted Seat is 16½" wide, 14½" deep, and Plaited Backrest is 8" high, 13" wide. Both are upholstered in long-wearing, hair-filled genuine leather. Chair frame is of practically indestructible 1" tubular steel, with all joints welded. Distributed exclusively by Stromberg-Carlson.

STANDARD CHAIR HEIGHT SPECIFICATIONS

Seat Height Adjustment	*Footrest Height From Floor*	*Seat Height Adjustment*	*Footrest Height From Floor*
18" to 22"	5"	24" to 28"	10"
20" to 24"	6"	26" to 30"	12"
22" to 26"	8"	28" to 32"	13"

EXCLUSIVE WITH STROMBERG-CARLSON

Habirshaw Wire

Both types of Habirshaw Drop Wire, illustrated at the right, are:

1. **High in Dielectric Strength.**
2. **Flame-Resistant—Sheath will not conduct flame.**
3. **Weather-Resistant—No exterior braids to weather and festoon; impervious to the effects of moisture, acids, oils, and factory fumes.**
4. **Mechanically Strong.**
5. **Time-Tested.**

Habirdure General Purpose Wire is small in diameter, has a clean, smooth finish, resists abrasion (no braids to fray), resists oil, acid and alkali, does not oxidize, is flame-proof, and has ridged markers for positive conductor identification. Initial cost is low, and one stock covers inside, jumper or duct use requirements.

NO. 17 BRONZE PARALLEL NEOPRENE SHEATHED DROP WIRE

NO. 17 BRONZE TWISTED PAIR NEOPRENE SHEATHED DROP WIRE

NO. 22 OR NO. 19 TWISTED PAIR HABIRDURE GENERAL PURPOSE WIRE

NO. 22 OR NO. 19 TRIPLEX HABIRDURE GENERAL PURPOSE WIRE

STROMBERG-CARLSON

Factory, General Offices: Rochester 3, N. Y.
Branch Offices: Chicago 6, Kansas City 8, San Francisco 3
In Canada: Stromberg-Carlson Company Limited, Toronto

TELEPHONES, SWITCHBOARDS AND INTERCOMMUNICATION SYSTEMS • SOUND EQUIPMENT AND INDUSTRIAL SYSTEMS • RADIOS, RADIO-PHONOGRAPHS, FM AND TELEVISION

STROMBERG Telephone CARLSON

Jay G. MITCHELL'S *Commentary*

***Editor's Notice:** The opinions expressed herein by Jay G. Mitchell are his own. The Editor reserves the right to disagree with any of them, editorially or otherwise in the columns of this publication at any time.*

APRIL: This is the traditional month of new beginnings. It is the favorite of the poets. In our business it marks the emergence of the plant from the grip of winter. This year it also is an index of the end of five years of war time restrictions in many ways. Now it is possible to plan for the future. While the plans for the years to come may have to be temporarily modified because of material and equipment shortages they should nevertheless be made.

• • •

THIS NUMBER: The April number of TELEPHONE ENGINEER AND MANAGEMENT is carefully planned to be of value to telephone companies, large and small, in their Spring Construction work. I have scanned the excellent articles to be included and personally recommend their careful reading by every telephone executive, especially the plant department. It is, of course, impossible to include in one issue all the material that is available and helpful. The selection is made by careful conferences with an added understanding known throughout the staff. That is that the facilities of the magazine are available to its readers for **specific help** in any possible way upon request. Read the excellent material and then write us for any information desired which is not covered in the formal published articles.

• • •

SPRING: When this monumental pillar of sagacity begins to think about spring it is just a little hard to concentrate on Spring Construction in telephone plants. Each year the industry shakes itself loose and begins the work of repair, new construction and general betterment. Betterment in general includes betterment of revenue, betterment of plant and betterment of service. This number is devoted to Spring Construction. If not already available as a current compilation during the winter a list of the things to be done in the plant is to be completed. This should be supported by a more or less thorough survey of plant conditions. Because it is directly a matter of revenue the "Held Order" file must be studied in a systematic way by the plant department. This study will disclose the requirements for plant construction material essential for the establishment of the new service contracted but not yet connected.

MODERNIZATION: For five war years the entire communication industry has been developing improvements in the art. This was done, largely, for the Government but many of the results are available now to commercial telephone companies. This spring while making long range plans for the plant is an excellent time to consider service modernization. There are many reasons why this is true. One is that the entire population contains millions of individuals who have traveled far and wide. They have seen and learned what modern communication can be. They are your subscribers and they are likely to demand the best in service. The manufacturers will be more than glad to display their equipment and help in your plans.

• • •

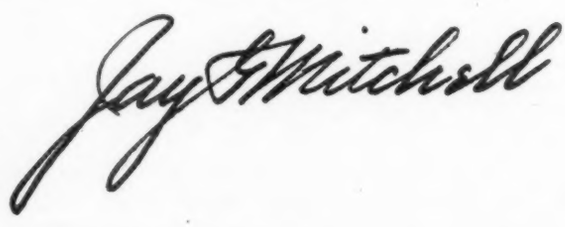
PHANTOMS: To save wire, where good physical circuits are available, extensions can often be made by installing phantoms. When this is feasible the revenue produced is realized at a substantial reduction of plant cost. One of the important things for the telephone company to do this spring is to study the possibilities of using phantom circuits.

• • •

SHORTAGES: About the first item in any list of required construction material will be lead covered cable. Ray Smith in his NEWSLETTER of March 7, 1947 pointed out the reason why lead covered telephone cable is **likely to be very scarce for at least 24 months.** Nothing but dribbles can be expected during 1947. Right at the beginning of the planning it is advisable to figure on using some pair wire in rings on a messenger to establish the service to waiting subscribers. In my opinion under present conditions it would be the conservative thing to do to make plans for cable and when other material, such as twisted pair wire on a messenger, is actually used to install the distribution cable terminals according to the cable plan if the terminals are available. Then when and if some cable can be secured it can be cut in without disarranging the overall plan. To a limited extent, when your supplier is unable to ship conventional telephone twisted pair, it may be possible to use some army surplus field wire or assault wire. This wire is now being sold at rather attractive prices but it is not suitable for permanent general use in telephone circuits because of high resistance and the difficulty of splicing. As a stop gap, when proper wire cannot be obtained, its use is justified in order to establish service to waiting and patient or impatient new subscribers.

• • •

TRUCK BATTERIES: Increased battery capacity in trucks for positive mobile radio and standby operations involving many auxiliaries has apparently been solved by the development of a three phase A.C. generator and full wave three phase rectifier to replace the conventional D.C. generator. At low engine speeds this new combination has a very high output compared with the conventional D.C. generator at the same engine speeds. At high engine speeds the output is closely regulated so that, from a practical standpoint, a very large battery can be kept fully charged while carrying loads that could not be possibly carried by the conventional D.C. automobile generator. The A.C. generator has no sliding contacts in the output circuit and no commutator to cause circuit trouble. The entire battery charging outfit is available in kits for standard engines. It is manufactured by Leece-Neville Company, Cleveland, Ohio. Seems like a good idea to me when used in a vehicle imposing very heavy battery drains for the operation of many standby items of equipment.

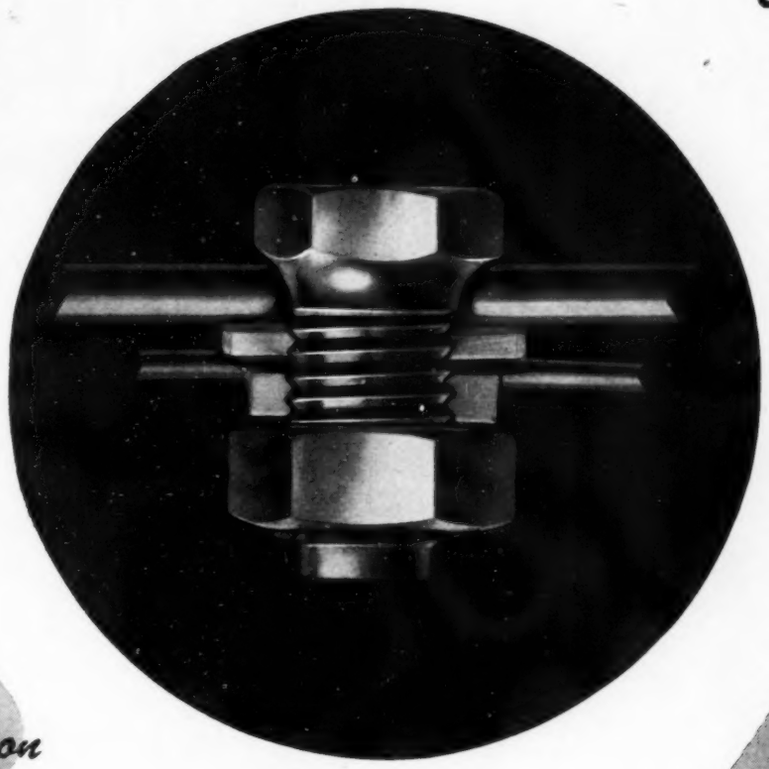


Reliable *because...*

—as in all Reliable Telephone Equipment, the Reliable Solderless Connector is basically sound engineering. Precision manufacture, simplicity of design and carefully selected materials, plus constant laboratory testing means Reliable service under all conditions. Build for the future—specify Reliable equipment.

1 Excess Strength

Reliable Solderless Connectors are available for use with all types of conductors. They are made of high strength bronze and cannot be distorted with a standard socket wrench.



2 Uniform Connections

Precision threads—provide a high percentage of torque efficiency. This feature means thread friction is reduced to a minimum to attain increased pressure on the conductors.

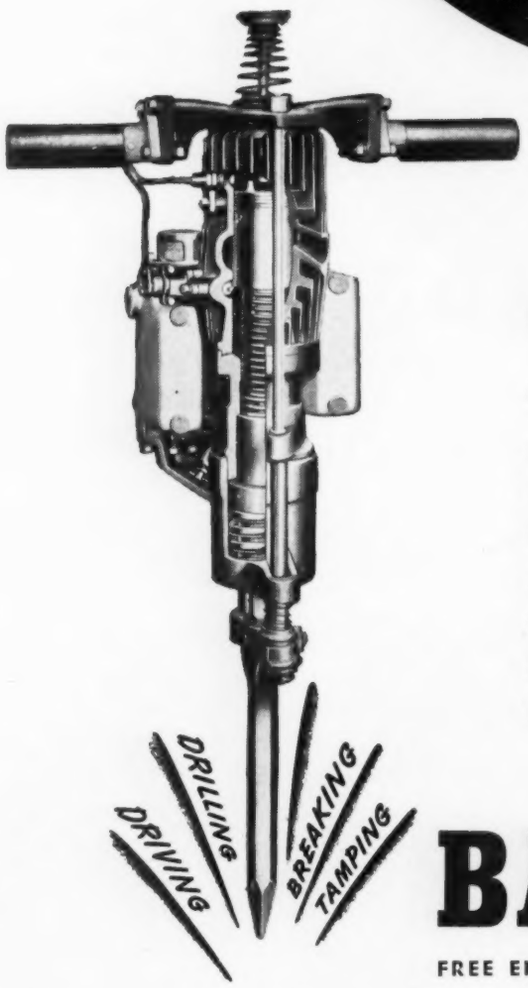
3 Vibration Proof

Each type Reliable Solderless Bridging Connector is readily re-usable, yet will not loosen from vibration.

4 Non-Corrosive

Plating on connectors for iron wire taps will not wear off nor cause corrosion. Heavy washer separates line and tap wires.

RELIABLE
ELECTRIC COMPANY
3145 CARROLL AVENUE, CHICAGO 12, ILLINOIS



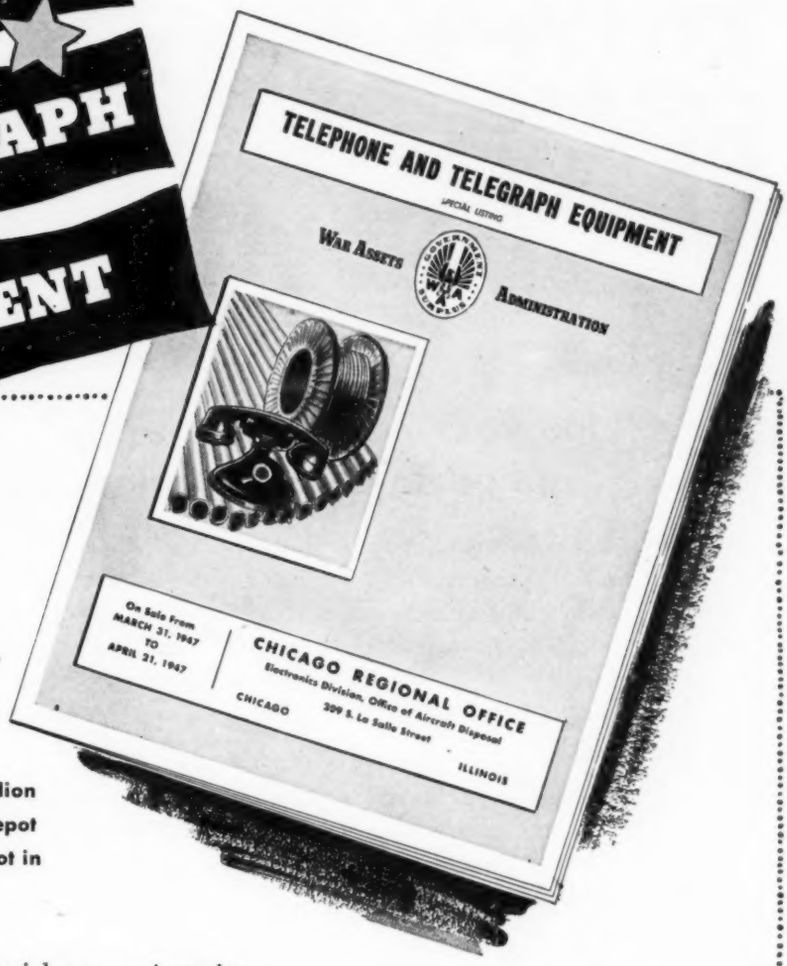
ON A THOUSAND AND ONE JOBS!

The all-around usefulness of Barco is lifting this Portable Hammer's popularity to new heights. Breaking, drilling, driving, tamping—there's almost no limit to the range of jobs Barco can do. Barco is easy to handle, easy to maintain and mighty difficult to do without. Send for complete details. Barco Manufacturing Co., Not Inc., 1835 Winnemac Avenue, Chicago 40, Illinois. In Canada: The Holden Co., Ltd., Montreal, Canada.

BARCO PORTABLE GASOLINE HAMMERS

FREE ENTERPRISE — THE CORNERSTONE OF AMERICAN PROSPERITY

TELEPHONE and TELEGRAPH EQUIPMENT



This material consists of Wire & Cable, Cords, Head & Chest Sets, Repeaters, Switchboards, Telephone, Test Equipment, Tool Equipment & other Miscellaneous Items.

Its condition is described as "USED" and "UNUSED", and originally cost over two million dollars. It is located at The Decatur Signal Depot in Decatur, Illinois and the Chicago Sub-Depot in Chicago, Illinois.

Listings completely describing the material are available at any War Assets Administration Regional Office. Ask for "Listing WAL-C9-59 dated March 31, 1947" which contains detailed information about condition and how to obtain permission to inspect the material. This listing also contains forms which *must be used* for the submission of all orders.

The equipment and parts are unpackaged (although most cable is on reels), but will be packaged after sale, when necessary, for shipment.

All sales are subject to the Standard Conditions of Sale of the War Assets Administration and will be for cash, unless credit terms have been arranged.

This surplus property is announced concurrently at fixed prices to all priority claimants and to commercial purchasers. *20%* of this material has been reserved to fill orders received from Federal Agencies.

After Federal Agencies' and certified Veterans' requirements have been filled, other orders received by April 21, 1947 will be filled in the following sequence: R.F.C. for resale to small business, state and local governments and their instrumentalities, certified non-profit organizations, and commercial purchasers.

Veterans of World War II should apply at their nearest WAA Certifying Office for certifications; the case number and the location of the Certifying Office must be stated in the Veteran's "Offer-to-Purchase".

Unlimited orders are accepted. The right is reserved to reject any or all orders. All orders should be sent to War Assets Administration, (Electronics Division, Office of Aircraft Disposal) 209 South LaSalle Street, Chicago, Illinois.

ELECTRONICS DIVISION

WAR ASSETS ADMINISTRATION

GOVERNMENT WAA SURPLUS

Offices located at: Atlanta • Birmingham • Boston • Charlotte • Chicago Cincinnati • Cleveland • Dallas • Denver • Detroit • Fort Worth • Helena Houston • Jacksonville • Kansas City, Mo. • Little Rock • Los Angeles • Louisville Minneapolis • Nashville • New Orleans • New York • Omaha • Philadelphia • Portland, Ore. Richmond • St. Louis • Salt Lake City • San Antonio • San Francisco • Seattle • Spokane • Tulsa

940

WHY You Should Specify "PENTA" PRESERVATIVE TREATMENT...

for your poles, cross-arms and other exposed wood

1. Chapman "Penta" Preservative is *clean*—not sticky or unpleasant for linemen and other workers. In fact, with proper choice of solvent carrier, it is possible to treat wood thoroughly with "Penta" Preservative and have it virtually the same in appearance and feel as untreated wood.

2. Ten year tests prove that Chapman "Penta" Preservative gives you superior protection against rot, termites and other enemies of wood. No other material commercially available today can do a better job.

3. Chapman "Penta" Preservative costs no more than familiar materials, and treatment is applied with the same equipment and in substantially the same way as old-fashioned preservatives. That means you can buy treated poles and cross-arms—or have your own material properly treated—in any part of the U.S.

Write us for details and evidence to confirm the statements made above.

CHAPMAN

CHAPMAN CHEMICAL COMPANY
Suite 540
333 North Michigan Avenue, Chicago 1, Illinois

Chapman "Penta" Preservative contains *Pentachlorphenol*
a product of
The Dow Chemical Company

Do You

BY RICHARD ALLEN

An early doubter of Alexander Graham Bell's telephone called a demonstration a fake—demanded that the floor be torn up to expose the scoundrel he thought would be underneath "talking through a hole in the box."

★

A new type of pay-station cheat is on the loose. The "Slicker" moulds ice in shape of nickels—and does get free calls.

★

About 135,000 miles of telephone wire link radio stations with other radio stations.

★

In the late '70's and '80's, telephone wires and fixtures were commonplace, and some owners were paid for "house top" privileges.

★

In 1920, carrying on the average toll conversation was like conversing with a person in a quiet open field at a distance of approximately 80 feet. Now the equivalent distance is about 15 feet.

★

Today one man installs a telephone completely in an average of 90 minutes. Fifty years ago the same job took a crew of 7 or 8 men an entire day.

★

Although they look alike, two telephone handsets made by the same process could never be

ou Know?

ILLUSTRATED BY PAULSON

made exactly alike. Dimensions, weight, performance—all vary every time due to variables in manufacture.

★

Principal German cities were connected by a network of coaxial cable designed to handle 200 simultaneous telephone conversations.

★

Poles are being supplied despite critical shortages by combing every possible source of supply from the deep South to timberline in the Rockies. Douglas fir, lodgepole pine and larch poles are helping fill the orders.

★

In the high Sierras and Cas-

cades where snow often piles high enough to cover poles completely, a "snoplane", powered by airplane motor and propellor, takes men and materials on trails impossible by truck.

★

Within jurisdiction of the Ontario, Canada, Municipal Board are 560 telephone systems, operating 144,615 telephones, 32,062 miles of pole lead carrying 210,781 miles of wire, and representing an investment of $12,500,000.

★

How does your plant cost per telephone compare with these?

	Amount	% of Total
Telephone Instruments	$ 16	6.5
Lines & Equipment between telephones and central office	90	36.7
Switchboards & Equipment in Central Office	71	29.0
Toll & Long Distance Lines	37	15.1
Land, buildings and other plant	31	12.7
	$245	100.0%

Put 'Em Up Right, —Then Forget 'Em

TELEPRENE { DROP *and* BRIDLE } **WIRES—**

Strengthen the Weak Link In Your Outside Plant.

The Difference in Cost is Pennies
The Difference in Life is Years

TELEPRENE Drop and Bridle Wires have Teleplated Conductors which provide ENDURING ADHESION equal to the tensile strength of the conductor.

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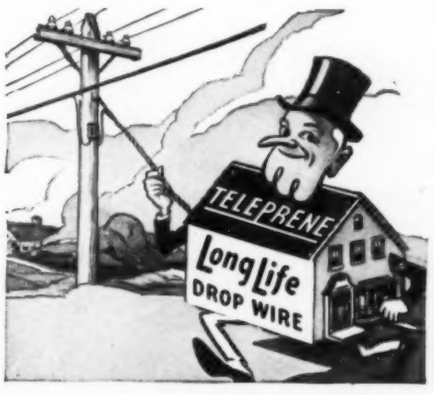


GraybaR Distributed by GraybaR ELECTRIC COMPANY

THE WHITNEY BLAKE CO.
New Haven, Conn.
Well Built wires since 1899

number, please?

Can you guess the number of employees the Bell System has added in the past year? It's about 150,000.

This figure gives a good idea of the effort being made by the telephone industry to give more and better service.

Our advertisement in April magazines, shown on the opposite page, tells this story to the public.

AN ADVERTISEMENT OF THE BELL TELEPHONE SYSTEM

We've added 80,000 Telephone Girls in the last year

We're working hard to give you more and better telephone service than ever before.

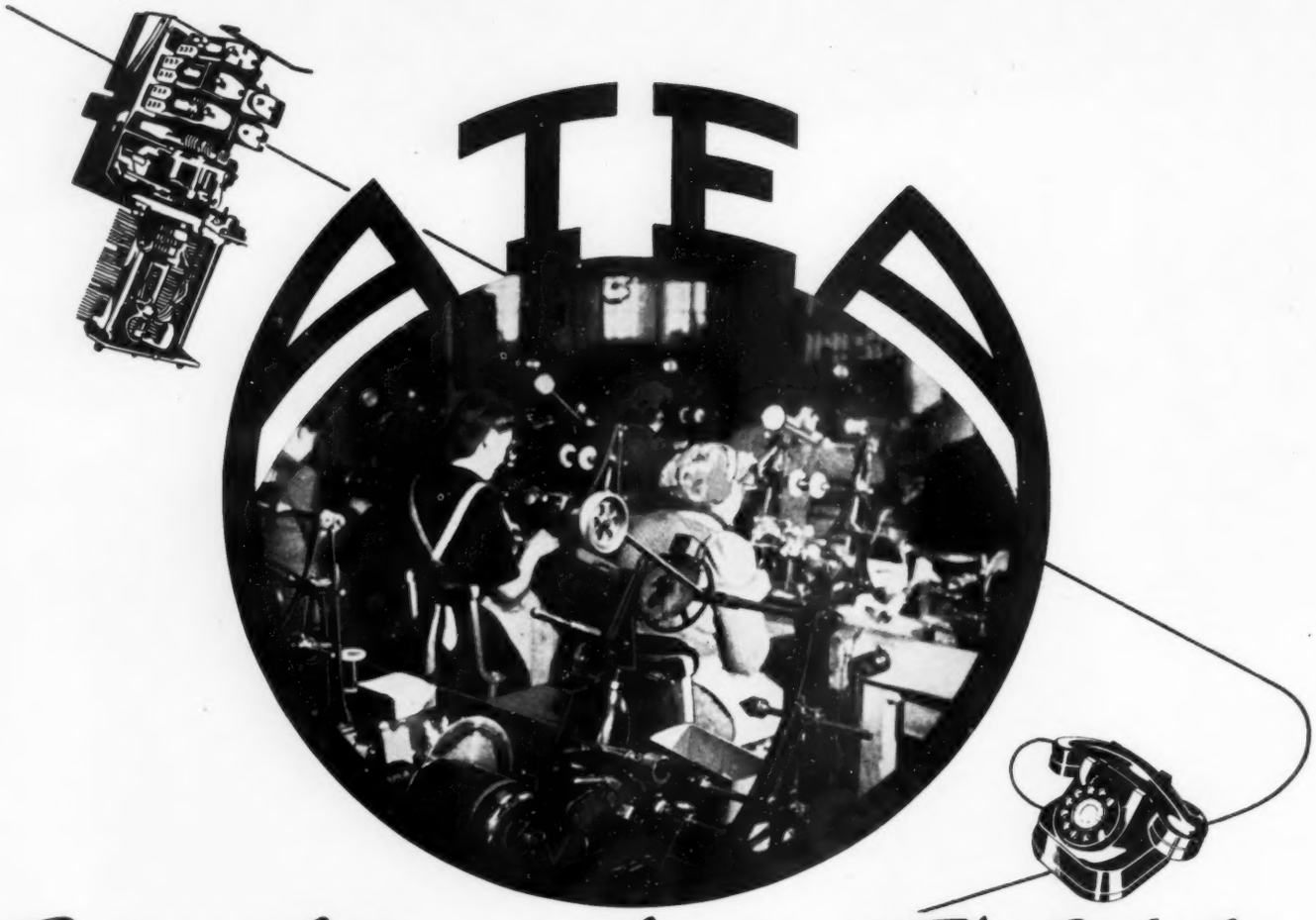
In the last year, we have added 54,000 telephone operators; also 26,000 service representatives, secretaries, clerks, stenographers, typists and manufacturing employees.

These are just the figures for women. We have also increased our employees by 70,000 men—most of them war veterans.

Yet in spite of record figures on employment, manufacturing and installations, we are greatly concerned that there are still more than 2,000,000 people waiting for telephone service and many who are not getting the kind of service they want.

We want you to know that we are doing our level best to catch up with every telephone need of everybody—everywhere.

BELL TELEPHONE SYSTEM



From Antwerp Around The World-

travels the trademark of Automatique Electrique. Through the facilities of the International AUTOMATIC ELECTRIC Group, communication and electrical industries the world over have come to know this mark on superior telephone instruments and telephone exchange equipment for every operating need.

World-wide acceptance of products bearing this trademark has been insured by a half-century of manufacturing experience and skilled craftsmanship. This "know-how" assures the ability of Automatique Electrique to meet the demands of every public service organization.

Wherever you are . . . whatever your equipment requirements may be—the International AUTOMATIC ELECTRIC Group is prepared to serve you. Here you secure products of the finest quality—products of leading manufacturers of telephone equipment.

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AUTOMATIC ELECTRIC SALES COMPANY, S. A.
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AUTELCO MEDITERRANEA, S. A. T. A. P., Milan, Italy
and other manufacturers
Selling Companies and Agents Throughout the World

☆ *Advances in the Industry*

New Telephone Ideas

BY MYRLE SHAFER

Anthraquionone

Crucial links in every wire and radio system are paper capacitors—rolls of impregnated paper and metal foils. At least one is in every telephone; a single failure can end a telephone call, put a costly line out of service. To make capacitors stand up has been a job. All-linen paper was once the preeminent material. Then wood pulp was tried—it lasted longer under heat and direct voltage. But why? Researchers found the answer and now by treating impregnated paper with anthraquinone—a dye intermediate—they know a pinch of the stuff prolongs capacitor life by many years.

Common Control Switching

In the not too distant future "common control" switching may be the order of the day. Such a switching system is one in which a telephone subscriber wishing to make a call states the desired destination to a "mechanical brain" contained in the central office. The brain sets up the connection, enlisting the aid of other mechanical brains in other central offices, near or far away. . . . Be on the lookout for electrical brains which can receive and remember a number, lay a plan of action and proceed accordingly, and if balked on the first attempt to establish a connection, can revise its plan and set up the connection over an entirely different path or route.

Pre-Set Dialing

In the forecast of things to come is a push-button device that the subscriber can "preset" to the desired number and then after satisfying himself as to accuracy, flash it to the central office in an instant.

Flying Radio Teletype

A new communications wonder proved in when an experimental model of a flying radio teletype showed it could perform in the air as well as on land. In the test, experimental light weight teletypewriters were installed in Civilian Aeronautics planes. The machine, with its associated apparatus, brings to the plane crew typewritten weather data direct by radio from a teletypewriter on the ground. The plane crew may also make the teletypewriter reports directly to the teletypewriter on the ground.

Hypnotism via Television

It's a minor point in the big field of communications, but the British Broadcasting Company, after several television experiments, which produced a number of glassy-eyed victims, has decided not to encourage hynotists to practice their talents via television. . . . They say that goes for broadcasting companies in the U.S.A., too. Any spell casting, trance induction, or waving of wands will, it is reported, have to be done by the direct personal appearance method.

"Listen to the 'Letter'"

The art of letter writing may be on its way out in this postwar world. Science is developing a means to record voice on paper, which can be folded and put into an envelope, mailed and sent anywhere. All the recipient has to do is unfold the paper, place it in a gadget like a radio and "listen" to the letter. . . . Other companies have patents on tape and wire recorders—but the blank piece of paper idea is holding the attention of engineers.

Cut POST HOLE DIGGING COSTS Down to a NEW LOW

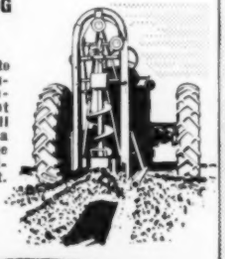
★ For Jeep, truck or tractor mounting
★ Makes hard work easy—saves money
★ One-man operated from driver's seat
★ Available in four models starting at $192.50

Continental INDUSTRIAL POST HOLE DIGGER

Many large Telephone Companies, as well as smaller independents, are endorsing the Continental Post Hole Digger for its simplicity, durability and low cost. Illustrated above with the four-wheel drive Jeep, it is also adaptable to any truck or tractor with rear end power take-off. Think of the potential saving over heavy investments in power units! Digs as many as 600 holes a day . . . adjustment for side hill conditions. Four models include auger diameters from 4" to 14", maximum depth from 44" to 72". Contact your supply house, or write for descriptive literature.

TRENCH DIGGING ATTACHMENT

Quickly attaches to any Continental Digger for digging conduit trenches. Light weight—flexible. Will even operate on a lawn or along edge of sidewalk. Specifications on request.



CONTINENTAL FARM MACHINE CO.

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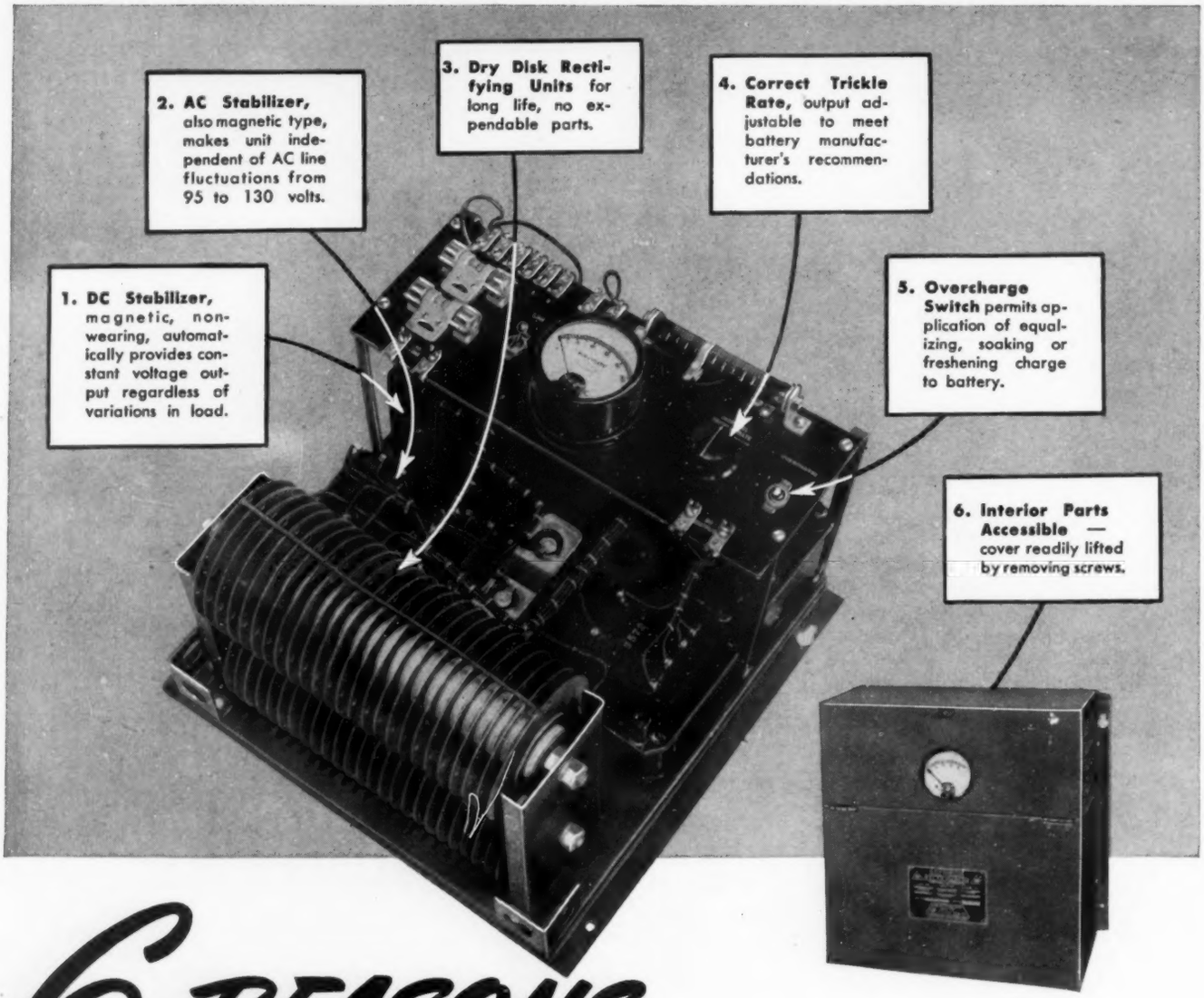
MINNEAPOLIS 1, MINN.


2. AC Stabilizer, also magnetic type, makes unit independent of AC line fluctuations from 95 to 130 volts.
3. Dry Disk Rectifying Units for long life, no expendable parts.
4. Correct Trickle Rate, output adjustable to meet battery manufacturer's recommendations.
1. DC Stabilizer, magnetic, nonwearing, automatically provides constant voltage output regardless of variations in load.
5. Overcharge Switch permits application of equalizing, soaking or freshening charge to battery.
6. Interior Parts Accessible — cover readily lifted by removing screws.

6 REASONS

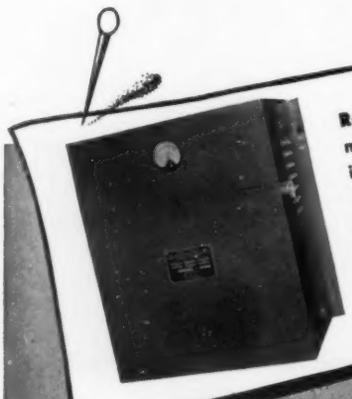
FOR INSTALLING THE RAYTHEON RECTICHARGER

With a small storage battery floated across its terminals, the Raytheon RectiCharger provides a closely stabilized DC output . . . longer battery life . . . and improved operation of manual or automatic communications systems.

These are *proven* advantages that stem from *exclusive* design and long service to the telephone industry.

When replacing, expanding or modernizing switchboard equipment, utilize Raytheon's extensive field experience and complete line. Adequate stocks are carried by your regular supplier of telephone equipment.

Write for Bulletin DL-RCR-506



Raytheon RECTIFILTERS . . . the modern economical way of obtaining telephone DC power direct from an AC source . . . improve telephone service, pay for themselves out of savings.

Detailed information in Bulletin PL-RFR-508

RAYTHEON

Excellence in Electronics

RAYTHEON MANUFACTURING CO.

Industrial Electronics Division

Waltham 54, Massachusetts

EDITORIAL

The Creative Urge

ONE of the basic desires of human nature is the urge to make something, to build something, to improve on something; to paint a picture that will be lasting; to compose a song that will be remembered; to write a book that will endure. In other words, the urge to create.

No man can have a finer epitaph than to have it said of him that he created worth-while things that will live after him.

It is primarily this urge to create, to build and improve—not merely a desire to make profits—that has made American industry great. Those who are continually assailing what they call the "profit motive" do not seem to understand that many people get more satisfaction out of the work they are doing than out of the money they are paid for that work or the profits they make by doing it.

The telephone industry has always had, as much as any other industry and more than some, this urge to create—to improve, build, expand. During the years of its existence its history has been, on the whole, one of constant improvement, expansion and betterment of the public service it renders. Only during war years and the years of the great depression has that progress been even temporarily arrested—and even during those years some progress was made.

The operating end of the telephone industry is fortunate that it has had and has available to it manufacturers and suppliers who have also the constant desire to improve the equipment and all other things used by the industry. The history of the development and improvement of telephone service is in fact a history of research, invention, development and other technological progress made by those who manufacture telephone equipment. Independent manufacturers have been responsible, over many years, for a great deal of this development.

During and since the second World War the demands upon the telephone industry for service have been almost unbelievable when compared with the normals of the past. The demand for telephones seems to be insatiable in some areas—particularly large urban areas. The telephone companies cannot catch up with held orders. As rapidly as they can install telephones, more people want telephones. Meanwhile the level of toll business is at an all-time high; in many places it is more than twice, per station, what it was before the war.

The industry's great public need now, insofar as meeting the demands upon it are concerned, is expansion. But telephone managements themselves know that another need, just as pressing, is that of betterment of plant now in service, to overcome many make-shift methods of expanding plant so as to meet demands for service during the war. They know that the quality of service to which the industry has accustomed the public in normal times, cannot be met unless in many cases plant is rehabilitated as well as expanded.

From the standpoint of supplying telephone service of good quality to all those who want telephone service, the job of the telephone industry right now is that of construction.

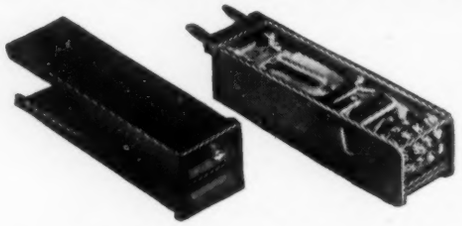
Gradually, but surely, that job is getting done. Gradually, but surely, manufacturers and suppliers are making headway against the avalanche of orders that confront them. Shortages of material and manpower are being gradually overcome.

But, until the job is fully done, this proposition of construction—for both expansion and rehabilitation—is going to be a number one item on the calendar of telephone managements.

That is why we are dedicating this issue of "TELEPHONE ENGINEER AND MANAGEMENT" to the job of construction, and we do that with the knowledge that the constant urge upon the telephone industry for betterment in every way is a guarantee that the job will be done, and well done.

LINK THE WORLD'S RESOURCES - - -

IN THE CENTRES OF COMMERCE - - -



THE STROWGER METER

- *Every meter is operated on test 10,000 times at the rate of 5 operations per second before leaving the factory.*
- *Meters selected from stock have performed 300,000 operations on "life test."*
- *The reverse drive principle is employed, making possible more uniform adjustment.*
- *Rachet wheels are made of tin alloy.*
- *Resistance of the coil is within ± 5 % of the required value.*
- *Insulation resistance is 100 megohms at 500 volts D.C.*
- *Any type of winding to suit any particular purpose can be provided.*
- *Meters can be supplied with contacts for controlling external circuits.*
- *Meters can be used for recording subscriber's calls, traffic flow through exchange equipment, etc.*

There are many towns whose vast activities are those of the bazaar; they are the "market-places" of the world. As a result of transactions concluded there a buyer located five hundred miles to the north may obtain articles manufactured three hundred miles to the south. The season's crop of a whole agricultural area or the steel output of a city may be bought or sold overnight. Reliable means of communication must be available at all times. Strowger Automatic Telephone Service fulfills this need. In addition to its efficiency in operation it is simple to maintain, capable of extension to cater for growing populations and economical to both operating organisations and users.

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"I'm a regular Scotsman for thrift. I never throw away anything I can use again.

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"I collect all the old telephone equipment, wire and cable no longer useful to the Bell System . . . and all the machine scrap, turnings and rejected parts from the factories where I *make* Bell Telephone equipment.

"I turn this scrap metal into bars and billets of refined metals and alloys out of which I make *new* telephone equipment. I salvage rubber, textiles and paper, too . . . and anything I can't use again, I sell. Nothing is wasted.

"My thriftiness, as supply unit of the Bell System, is one reason why you get telephone service . . . the world's best . . . at the lowest possible cost.

"Remember my name. It's Western Electric."

MANUFACTURER... of 43,000 varieties of telephone apparatus.

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Western Electric

A UNIT OF THE BELL SYSTEM SINCE 1882

ACORN

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Will Meet Your Requirements

CONDUCTORS: Bronze, Copperweld, Iron, Copper

INSULATIONS: Rubber and Plastics, (polyvinal chloride, polyethelene, etc.)

JACKETS: (nylon, neoprene, etc.) and a variety of Braids.

For 30 years ACORN has been specializing in the manufacturing of DROP WIRE, Bridle, Interior, Tree, Ground, Switchboard, Pothead Cable Terminal Instrument, Fixture, and Buried Wire . . .

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Whatever you NEED– we solicit your inquiry

that you CHECK your supply of these items and Order Today

Galvanized Steel Strand
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Oak Brackets
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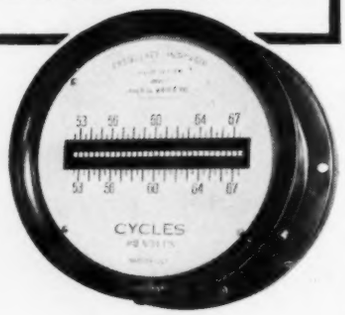

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1 Quart Can (800 grams), 12 per Carton.

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For Sale by the Manufacturer and leading telephone supply houses.

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W. A. HAMMOND DRIERITE CO.

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INVEST YOUR "PIN MONEY" IN THE BEST

LOCUST PINS

Locust wood is practically impervious to decay and is impenetrable to moisture. Because of its close-grained hardness locust can be machined into strong, long lasting pins of standard specifications that can be counted on to retain their size and shape.

OAK BRACKETS

Oak pole brackets of unquestioned quality are in demand now as never before in the face of the qualifications necessary in the equipment and materials needed today to "keep 'em talking." Present day maintenance and repair have every reason to demand and get only the best.

GLASS INSULATORS

Research and experiment have produced in Hemingray insulators a glass insulator that is better than any ever before offered.

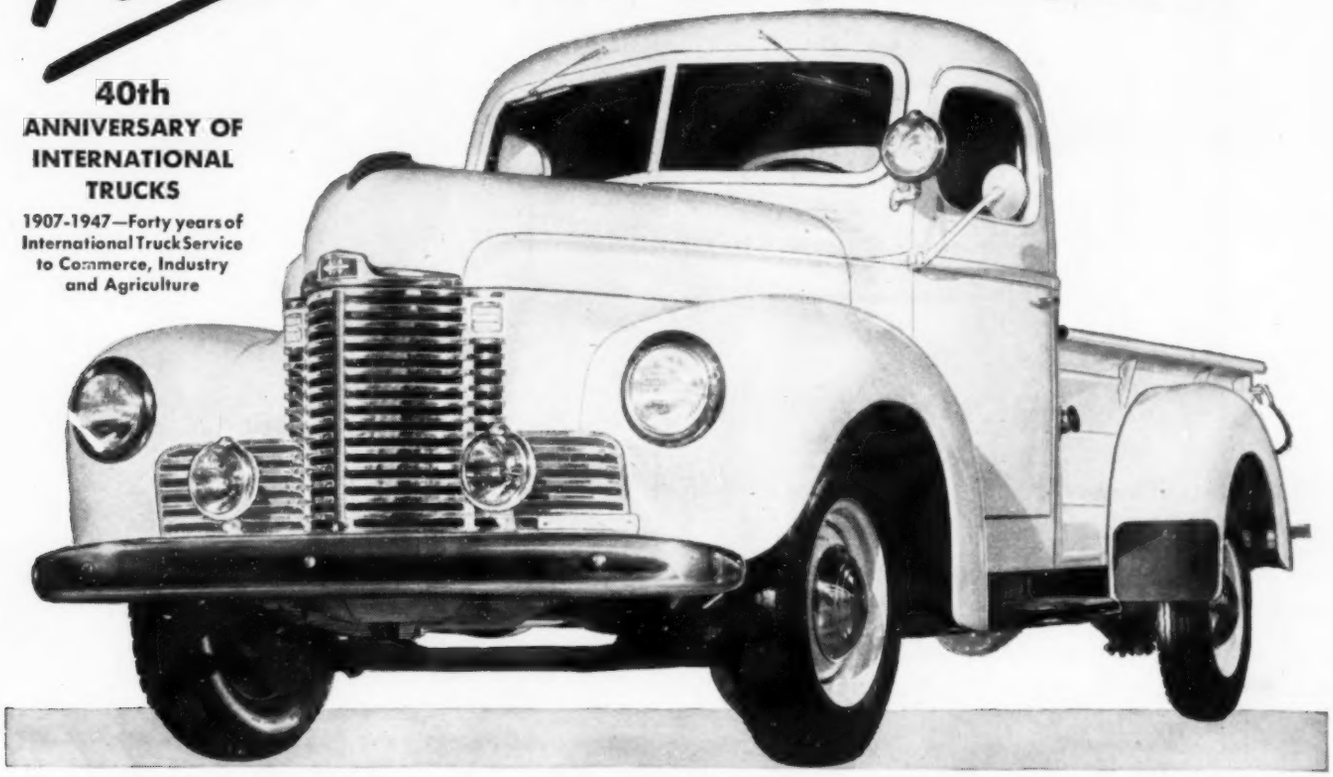
Non-porous, non-deteriorating, uniform coefficient of expansion and high mechanical as well as high dielectric strength are some of the many qualities that rank Hemingray the "best on the line."

BUCKEYE TELEPHONE and SUPPLY CO.

COLUMBUS 6, OHIO

New INTERNATIONAL TRUCKS
For Every Utility Job

40th
ANNIVERSARY OF INTERNATIONAL TRUCKS
1907-1947—Forty years of International Truck Service to Commerce, Industry and Agriculture



The International Model KB-1 with pickup body is available in two wheelbases, 113 and 125 inches. It is powered by the famous 6-cylinder Green Diamond engine with aluminum pistons, which develops 82.4 brake horsepower at 3,400 r.p.m. The three-speed sliding gear selective-type transmission has the gearshift on the steering post. Loading space of pickup bodies, mounted on 113-inch chassis, is 77¼ inches; 125-inch chassis, 89¼ inches.

There are 15 basic models in International's brilliant new KB Line of Trucks. These 15 basic models *specialize* into more than 1,000 different transport units. That means that there is a *specialized* International Truck for every utility job, from the smallest to the largest.

And how the new Model KB Internationals do their jobs! With what economy, long, trouble-free service and ease of operation! They're the finest values in 40 years of International Truck history, and International Truck values are so outstanding that for the last 16 years more heavy-duty International Trucks have served American commerce and industry than has any other make.

New KB Internationals display brilliant styling that sets new standards for the truck industry. Throughout the 15 basic models numerous features and improvements have been incorporated, all contributing to greater truck performance.

See your International branch or dealer now about new KB Internationals and learn how these brilliant new transport units can serve you.

Motor Truck Division
INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago 1, Illinois

Tune in James Melton on "Harvest of Stars" every Sunday!
NBC Network. See newspaper for time and station.

INTERNATIONAL

INTERNATIONAL *Trucks*

What's She Got That We Haven't Got?

Why, the answer is bethanized coating, of course. And in this case, beauty is more than skin-deep.

For a bethanized coating gives vital protection to your Bethlehem strand—protection against the corrosive effects of moisture, smoke, and acid fumes. And it's so ductile it virtually eliminates the hazards of checking, peeling, and flaking.

Bethanizing is an exclusive Bethlehem process of zinc-coating wire. The protective "armor" is applied electrolytically by a method that does not impair the desirable physical properties of the base wire. This coating is available in A, B, and C weights—you pick the one that best meets corrosive conditions in your particular area.

Remember, Bethlehem strand is the *only* strand that is furnished with a bethanized coating.

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The Spring Construction Program

by

B. C. BURDEN

(Technical Consultant, Lincoln, Nebr.)

CAREFUL PLANNING of telephone plant additions and changes result in improved performance and lower "period costs." Mr. Burden's article is packed with suggestions that will help you get your "spring construction" activities started.

THE RETURN OF the swallows to Capistrano and the start of spring construction in the telephone field are two events that usually occur about the same time. Construction activities start off slowly during the spring months and reach their peak during the period from June until October. All major construction projects should be preceded by careful planning designed to produce the most effective plant at the lowest possible cost. Some of the smaller Independent companies often overlook this need for advance planning and operate on a hand-to-mouth basis. This can only lead to poor design and inferior construction and projects being unduly prolonged because of inability to get needed construction materials on short notice.

The small exchange manager must function as a combination plant engineer, purchasing agent, and construction superintendent. His initial problem in connection with the summer construction program is the matter of plant design. If the replacement of a substantial amount of worn-out plant is involved, or if the outside plant is congested and requires relief, studies should be made to determine the type of construction that should be placed. The following paragraphs discuss some of the most important of the basic requirements in planning for outside plant additions or changes.

Theoretically open wire leads should be designed to withstand the typical heavy storm to which the lead is likely to be subjected. The actual computation to determine the size pole capable of withstanding maximum storm conditions must take into account sleet loading and storm wind strength. As a guide to plant engineers the United States is divided into three storm *loading* districts as shown in Fig. 1. The heavy loading district embraces those areas in which a maximum weight of sleet (0.5 inch) and relatively high wind velocities are normally encountered. The light loading district is assumed to have no sleet but heavy wind. The medium loading district has less sleet (0.25 inch) than the heavy loading district and approximately the same wind velocity.

Fig 2 shows the three loading conditions as applied to a 104 mil copper wire. Equations are given in telephone handbooks (See Sec. 3—Handbook for Telephone Managers and Engineers) which enable the plant engineer to compute the size pole needed to withstand any assumed storm condition. Pole lines

Table No. 1—Toll Leads Having an Ultimate of More Than 15 Circuits

No. of Bare Wires (104 or 109 mils)	Class Pole and Span Lengths 130′	150′	175′	200′
	Heavy Loading Area			
16-20	6	5	4	3
21-30	5	4	3	2
31-40	3	3	2	1
41-50	3	2	2	..
	Medium Loading Area			
16-20	7	7	7	7
21-30	7	7	6	6
31-40	6	6	5	5
41-50	5	5	4	3
	Light Loading Area			
16-30	9	9	9	9
31-40	9	9	7	7
41-50	7	7	7	7

Table No. 2—Toll Leads Having an Ultimate of 15 Circuits or Less

No. of Bare Wires (104 or 109 mils)	Class Pole and Span Lengths 130′	150′	175′	200′
	Heavy Loading Area			
1-15	9	9	9	7
16-20	9	7	7	7
21-30	7	7	7	6
31-40	7	6	6	5
41-50	6	5	5	4
	Medium Loading Area			
1-15	9	9	9	9
16-20	9	9	7	7
21-30	7	7	7	7
31-40	7	7	7	6
41-50	7	6	6	5
	Light Loading Area			
1-30	9	9	9	9
31-40	9	9	7	7
41-50	7	7	7	7

Table No. 3—Leads Carrying Only Exchange and Rural Circuits

No. of Bare Wires (109 mil)	Class Pole and Span Lengths 150′	175′	200′	225′	250′	275′	300′	350′	400′
	Heavy Loading								
1- 4	9	9	9	9	9	9	9	..	..
5-15	9	9	9	7	7	7	7	..	..
16-20	7	7	6	6	6	5	5	..	..
21-30	7	7	6	6	6	5	5	..	..
31-40	6	6	5	5	4	4	3	..	..
41-50	5	5	5	4	3	3	2	..	..
	Medium Loading								
1-15	9	9	9	9	9	9	9	7	..
16-20	9	9	9	9	9	7	7	7	..
21-30	9	9	7	7	7	7	6	6	..
31-40	9	7	7	7	7	6	6	5	..
41-50	7	7	7	6	6	5	5	4	..
	Light Loading								
1-30	9	9	9	9	7	7	7	7	7
31-40	9	9	7	7	7	7	6	6	5
41-50	7	7	7	7	7	7	6	5	5

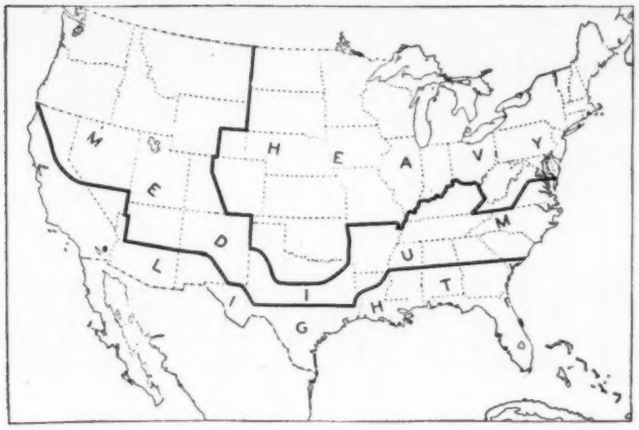

Fig. 1—The Storm Loading Districts (Courtesy Bureau of Standards)

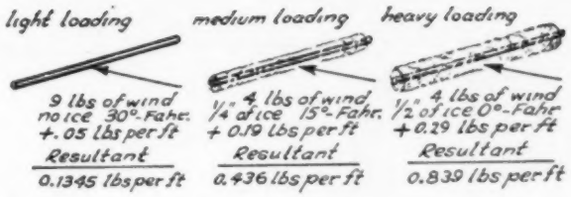

Fig. 2—Storm Loading Factors as Applied to a 104 Mil Copper Wire.

are usually designed for a *safety factor* which is proportional to the *service value* of the circuits carried by the pole line. Important toll lines have the highest service value and rural lines the lowest.

Pole Line Design Tables

PRECISE COMPUTATIONS which take into account probable storm loads and the number of wires carried, are desirable in connection with the major toll lines of the country, but many Independent companies, particularly the smaller ones, have found that pole lines can be designed on the basis of tabular information and without the necessity of specific design computation for each case. Tables 1, 2, and 3, (on opposite page) which show pole sizes for various wire loads will be found useful in planning pole lines.

Joint Use Considerations

IN ALL CITY pole line design work, consideration should be given to the advantages of joint over non-joint plant construction. It is generally agreed that city plant should, where possible, be of the joint type. As shown in Fig. 3, separate power and telephone pole lines are unsafe and unsightly and may eventually be objected to by civic clubs. The hazards to personnel and equipment are usually regarded as somewhat higher with non-joint than with joint plant due to the difficulty of coordinating clearances at crossings and conflicts.

Some companies have shied away from joint plant, feeling that it would be too expensive to convert an entire exchange to a joint basis. Normally the conversion is not brought about all at one time but on a program basis. That is, as a section of the plant is rebuilt because of poor condition, it is placed on a joint basis. All construction in new additions are built on a joint basis. Thus an entire plant is gradually placed under the joint use program.

One of the first factors in consideration of joint use is the basic relationship between the power and the telephone company. One arrangement is for each party to own one-half of the total number of joint poles in the exchange. Ownership is usually so arranged that each company owns one-half of the poles in an *assigned area* rather than to have alternate pole ownership. Poles are kept in balance so far as possible and the tendency for pole ownership to become unbalanced is minimized by a rental charge of $2.00 per pole per year.

General Joint Agreement

THE CONTRACTUAL relationship should be covered by some form of *General Joint Use Agreement.* Telephone companies that have had no previous experience in preparing these agreements should consult with one of the larger Independents in an adjacent exchange for advice as to the kind of agreements normally preferred by telephone companies.

It is customary to make an annual check of pole ownership except in those areas where little or no change in pole ownership takes place. The primary purpose of the check is to determine which company has fallen behind in the number of poles furnished so that they can be brought into balance at an early date. The annual rental billing is based on the results of the yearly check. Fig. 4 (page 97) illustrates typical joint use plant and some of the clearance requirements.

Joint Use Rural Plant

IT IS ONLY in recent years that joint use between rural telephone and rural high voltage power lines has been given extensive field trials. The need for lower cost rural telephone construction has led to trial installations of joint use rural lines. In planning the summer construction program there may be situations in

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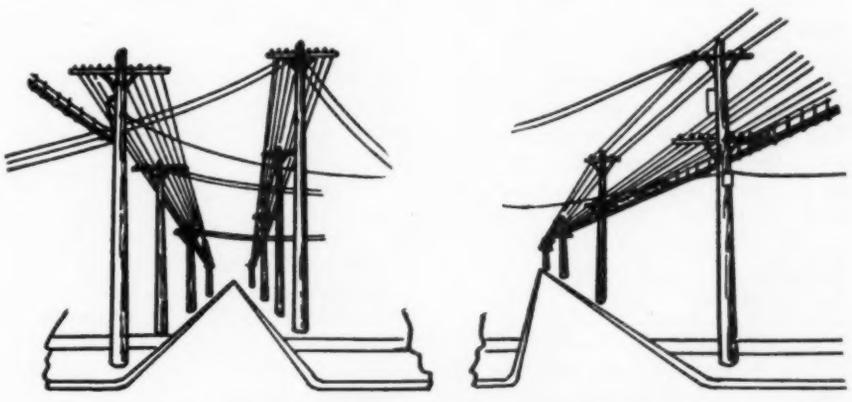

Fig. 3—Non-joint Plant is Unsightly and May be Hazardous.

BUSINESS INSTALLATIONS, as a rule are more complicated than residence installations, and often require ingenuity on the part of the installer to meet unusual conditions.

INSTALLING BUSINESS T

by

JOHN S. REED

TELEPHONE USERS in the commercial field are primarily interested in types of telephone services that will enable them to handle their business affairs in the most efficient manner possible. Various types of telephone services have been developed to meet the needs of executives and office workers. When the desired type of service has been selected for a particular type of business, there remains the matter of properly locating and connecting the instruments and auxiliary equipment. These items of equipment need to be located where they will be the most readily accessible to executives and office workers who have occasion to make and receive frequent telephone calls.

It is the purpose of this article to describe types of telephones adapted to serving the needs of business organizations and discuss methods of installing the telephone instruments and bringing station wiring to the instruments.

Types of Instruments for Business Offices

A LARGE VARIETY of telephone instruments are available to business subscribers. Of these, the handset is by far the most popular type and is generally supplied in three styles; namely, desk, desk-side, and wall. The self-contained or combination desk handset is preferred to the two-piece type, consisting of a separate desk handset and bell box. The two-piece set, however, is sometimes utilized in certain situations, as when it is desired to provide one handset with two bell boxes for key switching facilities. Figures 1 to 3 illustrate several well-known types of handsets. The use and location of the instruments and associated equipment are shown in Figures 4 and 5.

Fig. 1—The Stromberg-Carlson handset.

Methods of Distributing Station Wires

IN THE LARGER office buildings, telephone lines enter the building via cable and may terminate in an inside type (building) terminal, where the cable pairs are cross-connected to house cable or wiring in conduit; or in distributing terminals in cabinets on each floor of the building. Figure 6 illustrates a typical installation of distributing terminal.

If house cable is not utilized, the wires may be placed in: (1) Conduit already installed in the floors and walls, (2) steel or fiber ducts laid just below the floor level during building construction, (3) metal or wood base raceways, and (4) molding raceways.

Standard braid-covered inside wire is suitable for pulling into conduits, but may require the use of soapstone to facilitate the pulling operation on long runs. The newer type of inside wire with plastic jacket is easier to place than braid-covered wire, due to its smaller size and smoother coating.

An electrician's "fish" tape is the most satisfactory device for pulling inside wire through conduit. If the conduit is newly installed or it is suspected that moisture has accumulated inside the conduit, it is advisable to employ swabs to clean out and dry the conduit. The swabs are pulled through until they come out clean and dry.

In the case of conduit placed in floors and walls, lengths of conduit are run under the floor from the distributing terminals to outlets in walls and columns, or to outlets in the floor. This arrangement is generally found in small or medium-sized office rooms.

In buildings with large rooms, where rows of desks or tables are arranged on the floor and the wires are to come up through the floor at each desk, steel or fiber under-floor ducts are employed. The ducts are laid in grids with parallel rows of

TELEPHONES

Fig. 2—Leich common battery automatic handset.

Fig. 2A (lower left photo)—North Electric's dial handset.
Fig. 2B (right photo)—Kellogg Switchboard & Supply Company's desk-side handset.

header ducts, 20 to 60 feet apart, running across the room from wall distributing terminals. Branch ducts cross the header ducts at intervals of about 6 ft. Steel ducts have capped outlets in the header and branch ducts at intervals of 2 feet, while fiber ducts have outlets only at the junctions of the header and branch ducts, but may be pierced at any desired point for floor outlets. The wall distributing terminals are also tied together by conduit, and wall or column outlets may connect to duct junction boxes in the same manner.

When desks or tables are located by the wall, baseboard raceways are sometimes utilized to conceal the wire runs. One type of raceway is made of wood with grooves or channels in the back to accommodate wire runs. Another type is made of stamped metal with two channels covered by a removable face plate. The upper channel is intended for electric light and power wires, while the lower channel is reserved for telephone wire runs. With either type of baseboard raceways, an outlet box opens into the telephone wire channel and conduit is run from the box to the distributing terminal.

An older method of concealing wire runs makes use of picture moldings. Large raceways of this type are located in hallways and small raceways are placed on walls in rooms. These raceways are interconnected by short pieces of conduit through the wall between each room or between the rooms and the hall, as shown in Figure 7 (page 84). Distributing terminals are connected to the picture molding raceways by means of conduit. The wire run to the telephone instrument may drop down exposed on the wall or along the edge of door or window casements from the raceway. In other situations, the run may be concealed in conduit inside the wall to an outlet box near the baseboard.

If no provision is made for concealing the wire runs in conduit or raceways, it will be necessary to install wire runs by the same methods as employed in residence wiring for telephone installations. For over three pairs in a run, it is more satisfactory to utilize inside wiring cable or house cable, according to the number of wires involved. The use of cable clamps finished in colors harmonizing with the color of the braid covering will produce a neat installation when the cable must be placed in exposed locations. Inside wires and cables are available in brown color to match the finish of most wood trim, and in ivory to match lighter surfaces (white or cream). If wires or cables are run along wood trim, as on doors and windows or along baseboards, they will generally be inconspicuous.

In cases where it is desired to obtain a neat appearing installation in a large room and no means are available for running the station wires under the floor, this problem can be very satisfactorily solved by using flat molding attached to the floor. Figure 8 (page 84) illustrates a "Wiremold" over-floor wiring system that can be used for carrying up to 6 pairs of inside wires. For more elaborate inter-office communication sytems, flat molding for carrying two 26-pair inside wiring cables is available.

Fig. 3—Automatic Electric Company's handset.

Methods of Extending Wiring To An Office Desk

WHEN IT IS necessary to extend the inside wire or wiring cable to an office desk, one of several methods described below may be employed to properly protect the extended wiring.

If the desk is sufficiently close to the wall so that no one can conveniently pass between it and the wall, the inside wire or cable may be run along the top of the baseboard to a point directly opposite the desired anchoring point on the desk and the wire spanned across the intervening space as shown in Figure 9 (page 84). Each end of the spanning wire should be fastened down with a wiring cleat (or cable clamp in the case of inside wiring cable).

If the desk is located too far from the wall, and it is not possible to bring the wire run under the floor or floor covering, flat metal molding may be utilized to protect the run. An alternative method is to lay wood floor molding as illustrated in Figure 9. In this case the wire run is laid on the floor from the baseboard to

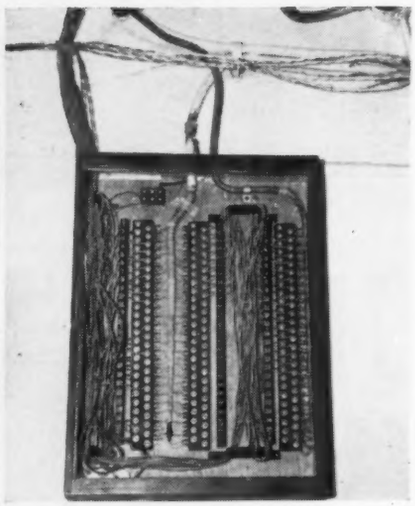

Fig. 4 (left)—Illustrating location of desk handset on office desk. (Note use of push button type switching key on opposite end of desk.)

Fig. 6 (right)—Distributing terminal for house cable.

Fig. 5—Typical installation of desk-side handset with dial on office desk. (Note location of switching key in knee well of desk.)

the desk and a beveled wood strip is placed on each side of the wiring and covered with fabric floor covering. Linoleum paste is used to fasten the wood strips and covering in place. When this work is properly done, the station wires will be adequately protected from scuffing under reasonably heavy traffic. This method is particularly useful in installations where the office equipment is moved at rather frequent intervals, or when the building owner objects to drilling of the floor to anchor fasteners for the molding.

Many offices have carpets covering the entire floor in the room. If permission can be obtained from the subscriber to lay the station wires under the carpet, it is possible to obtain a neat and satisfactory installation. The carpet is folded back the required distance and the wires are laid on the bare floor. It is advisable to untwist the wire and lay the separate conductors on the floor about 3 inches apart (preferably about 6 inches apart, if the floor is of cement or tile). On wood floors, the conductors may be held down at the baseboard with a piece of friction tape nailed to the floor with carpet tacks, care being taken not to get the conductors under the tack heads.

It is never necessary to cut the carpet in order to bring the wires through the floor covering. Rather, push the point of a pencil between the carpet threads at the desired location and gradually enlarge the hole without breaking the threads, until it is of the desired size. Thread the wires through the hole and lay the carpet back in its original position.

When the station wires can be run under the floor or in under-floor ducts, the wire run is brought up through a floor outlet or standpipe. The floor outlet or standpipe should be in position by one of the rear legs of the desk, where it will not be in the way of the user.

It is desirable to provide some slack in the wire run between the desk and the floor outlet or connection at the baseboard to allow for slight shifts in the position of the desk. This slack may be taken up by folding the wire back on itself and wrapping the folded wire with friction tape.

Wiring the Office Desk

AFTER EXTENDING the station wiring to the office desk, the next step is to wire the desk for the instrument and associated equipment. Ordinary wood desks usually are not designed for interior wiring; hence it is necessary to run the wiring on the outside of the desk. The routing of the wires depends on the kind of instrument installed, whether auxiliary switching equipment is utilized, and the method of extending the wiring to the desk. In general, the necessary wiring is run under the overhanging edges of the desk top and on the inside of the desk pedestals at the rear.

If a desk is designed to enable the wiring to be concealed, it should be carefully examined to locate the holes and channels provided for the wire run by the manufacturer. Usually an outlet hole is located in one side of the desk under the desk top for the instrument cord. A mounting bracket or wood strip may be placed near the entrance hole for mounting a connecting block for the instrument cord. The entrance hole for the station wire will often be found in the bottom of one or the other desk pedestal. In some types of metal desks, slots or holes are provided between the drawer tracks and the desk side paneling, through which the wire may be passed. In one make of desk, the wires are laid inside the turned edges of the desk top. Another make uses lengthwise channels spot-welded to the underside of the desk top (for reinforcing purposes) to carry the wires.

If the desk is to be moved from one location to another at rather frequent intervals, much time and annoyance to the installer can be saved by providing a connecting block on the underside of the desk pedestal next to the wire entrance. If no connecting block is needed in this location, the station wire should be wrapped with tape at this location to hold it in place and prevent abrasion of the wire covering on the edges of the entrance hole.

When the business subscriber desires that a telephone instrument be installed at an office desk, the instrument should be located as nearly as

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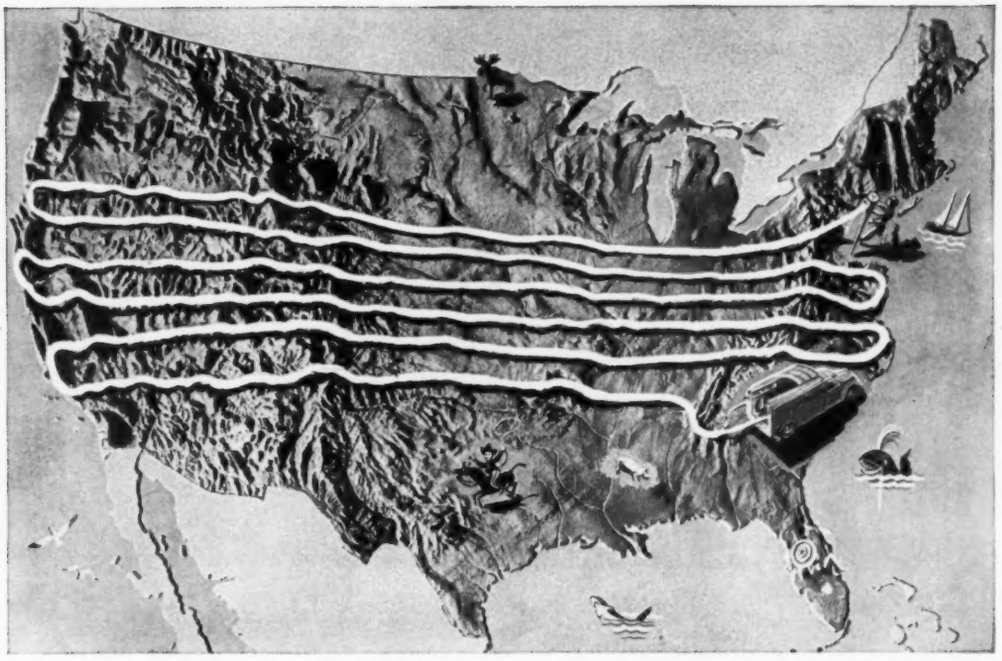


Enough telephone poles were set in rural areas in 1946 to carry a line across the continent about six times.

Progress In Extending Bell Rural Telephone Service

by

John J. Hanselman

and

Harold S. Osborne

(Courtesy Bell Telephone Magazine)

•

IN THE YEAR JUST ENDED, the Bell System's operating companies added about 330,000 telephones in farm homes, country stores, and rural establishments of various kinds. This was more than three times the increase in rural installations ever made in any previous year in Bell System history. Added to these are the more than 75,000 telephones installed in rural areas in 1945, bringing the total increase in rural telephone installations in two years to something more than 400,000. And last year alone, as those companies resumed their aggressive pre-war program for extending service to more and more farms, they set nearly 300,000 telephone poles—enough to cross the continent about six times—and strung about 130,000 miles of wire.

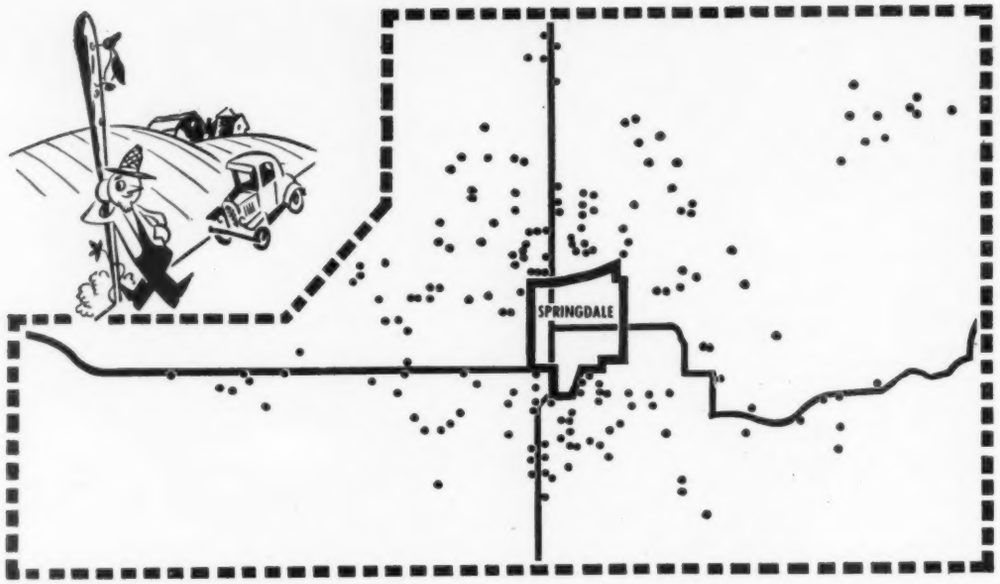
The objective of the Bell System, as stated early in 1945, was to add another million rural telephones within three to five years after men and equipment became available. Already, in consequence of the whole industry's determined efforts, *a higher proportion of America's farms are enjoying the benefits of telephone service than ever before.* Even though war needs for telephone equipment had to come first during nearly four years of conflict, that proportion has risen from 25 per cent in 1940 to the 40 per cent estimated for the end of 1946.

SUCH FIGURES, impressive as they are, take on new vitality when illustrated by what the Bell System companies are bringing about in such rural areas as, for example, Springdale, Arkansas.

That locality had been served by a number of ground-return telephone lines owned by farmers thereabouts. Their lines had deteriorated, and the need for better service was urgent. The Southwestern Bell Telephone Company was asked to extend its improved facilities into the area.

The entire area was surveyed, therefore, and plans were formulated to provide service on an area-coverage basis.

To the project were assigned a commercial representative, and an engineer with construction experience. These two, with the help of the Springdale manager on rights of way and similar matters, interviewed prospective customers and laid out the lines. In 37 working days they completed their interviews and the basic plans for building about 100 miles of new pole line and stringing more



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The activity at Springdale, Ark., is typical of the Bell System's extension of lines to serve whole rural neighborhoods. At the beginning of 1946, telephones in the vicinity, as represented by the dots, were relatively few.

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By the end of the year, as the result of a Southwestern Bell Telephone Company area-coverage project, there were two-and-a-half times as many telephones in service thereabouts.

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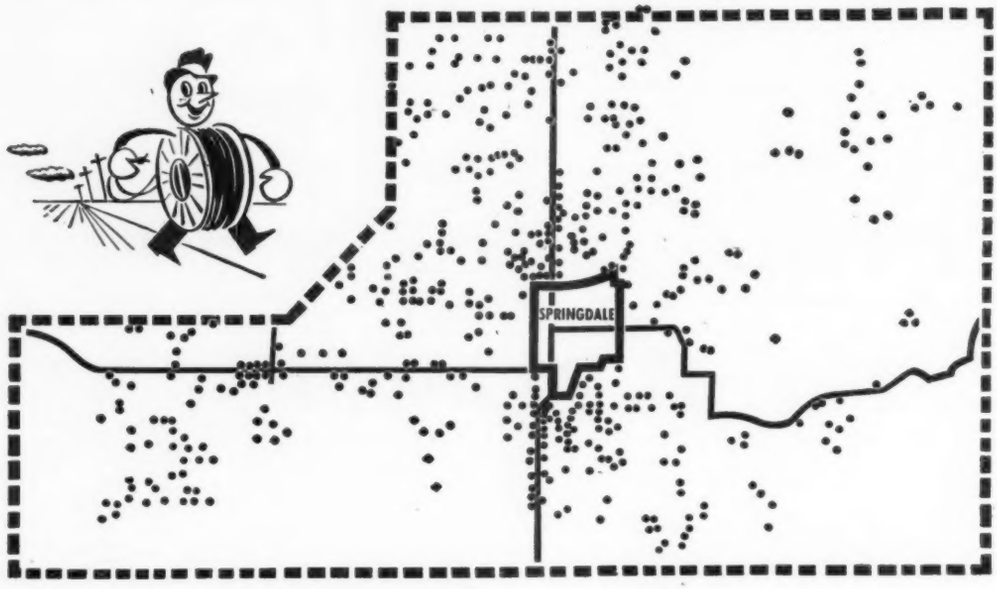


than 300 miles of open wire and 14 miles of cable to serve the area around Springdale. By the year's end, the whole job, which cost slightly more than $100,000, had been completed—and the number of customers had jumped from 196 to 517.

The diagrams portray more vividly than can those figures the results of the Bell System's rural program as carried out effectively in one area—with lines extended to provide service to entire neighborhoods, so that all who apply for service can have it. Other examples of such coverage would but repeat the story.

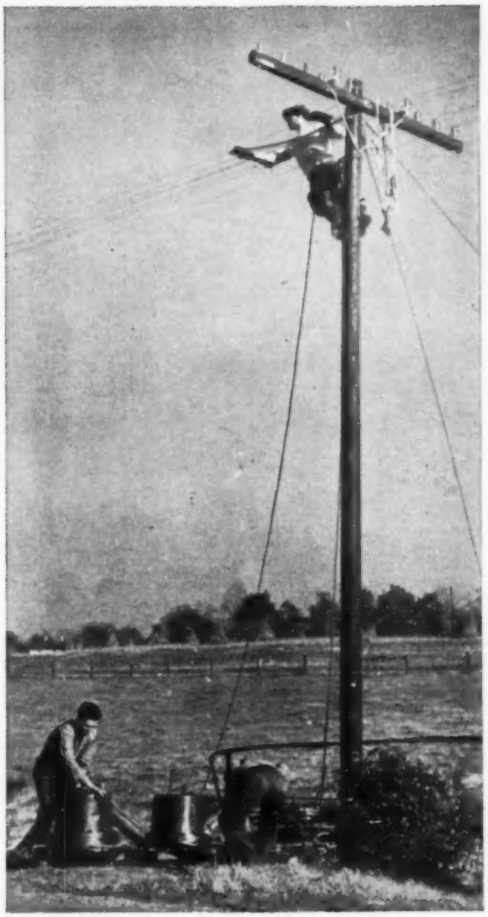
SUCH AN undertaking as that at Springdale can go forward smoothly and productively because behind it there lies a coordinated plan.

Even before the war ended, a great deal of pertinent information was gathered together by telephone men who drove up one country road and down the next. Detailed maps showing the location of rural families along those roads were prepared, and thousands of present and potential telephone customers were asked to tell what they felt rural telephone service should include—what improvements and new features would make it more pleasing and useful to them.

On such facts as these have been built the working plans for extending and improving telephone service in rural areas. And to execute those plans promptly, specially trained forces have been added and have been assigned specifically to the rural job, under the direction of men of long experience. At each step of the way, from the planning to the final connection of the customer's service, the work is scheduled, responsibilities are assigned, and men are made available to accomplish the job.

An important feature of the System's program has been a substantial increase in the amount of new pole line which the companies will build for each new customer without charge. Construction expense to the rural customer, therefore, has been greatly reduced and in most instances completely eliminated. Surveys made in more than 1,500 rural areas indicate that more than 80 per cent of all rural families can get telephone service today without having to pay for pole line construction. The free construction allowance has been increased substantially—it is now usu-

When telephone service is planned for a rural area the first step is to consult the people who live there. Often, as here, a commercial representative interviews a farmer in his field about his need for a telephone.



Then a long-span pole line is built to bring the high-strength steel wires into the neighborhood.

ally half a mile per customer—and is being applied on an "area coverage" basis.

This means that where lines are being extended to serve a particular section, any unused portion of a half-mile-per-customer allowance is credited to other customers in the neighborhood who require more. For example, if 10 new customers live within four miles of an existing pole line, and 10 more live six miles farther out in the same direction, service can be extended to all 20 customers without a construction charge to any.

For customers who may still need to pay some costs for construction, the charges have generally been reduced, and most Bell companies offer a liberal plan for payment in small monthly installments over periods up to five years.

NEW METHODS and new machinery have increased considerably the practicable range of rural telephone lines.

One example of this is the use of a high-strength steel wire, developed in recent years, for building long-span pole lines and laying them out straight across private property to minimize the number of corners.

Another example is the use of a new power-driven machine for digging pole holes and placing anchors. The unit consists of an earth auger driven by a gasoline engine through a flexible shaft. It is placed on a truck and the auger is raised and lowered by the truck winch line and derrick. Under favorable soil conditions, the new digger can bore holes as large as 16 inches in diameter to a depth of nine feet. Due to its lightness and flexibility of operating positions, it can be used on light-weight construction trucks instead of the heavy-duty trucks required with the older types.

Buried wire may be used in place of open wire where soil conditions are favorable and only one or two pairs will be required. The rubber-covered wire developed by the Bell Telephone Laboratories prior to the war has been improved considerably during the past year and is now undergoing field tests. It consists of a pair of 16-gauge copper conductors covered with rubber insulation, which is surrounded by a braided steel wire armor, over which is placed an outside jacket of tough, durable neoprene. Engineers are working on improvements in the truck-drawn plow which installs the wire in a furrow about two feet deep, and covers it over, in a single operation.

IN ADDITION to the construction methods just described, some new rural telephones—particularly those remotely situated—are being connected by various recently devised methods. These include power-line and telephone-line carrier, "joint use," and radio-telephone.

Power-line carrier is a means of extending telephone service to farms remote from existing telephone lines but close to electric power lines. This is accomplished by using the power line simultaneously for power service and telephone service. The high-frequency telephone current "hitchhikes" a ride along an electric power line and at a designated spot hops off onto a pair of telephone wires running to the customer's premises.

The equipment installed in a customer's house is not greatly different

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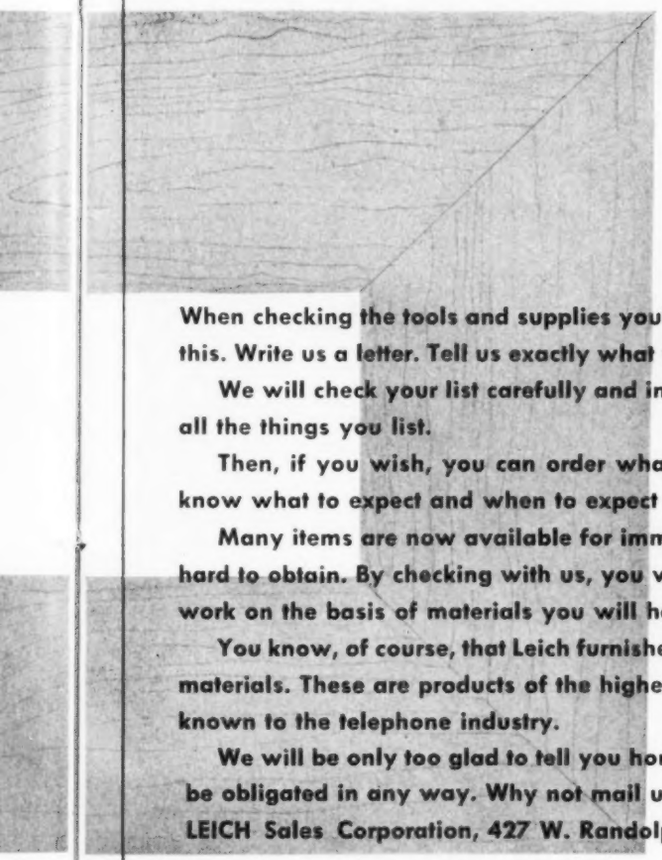
HOW LEICH CAN HELP YOU WITH
YOUR SPRING CONSTRUCTION NEEDS

LEICH



When checking the tools and supplies you'll need for spring construction work—do this. Write us a letter. Tell us exactly what you need and when you will need it.

We will check your list carefully and inform you of the expected delivery dates on all the things you list.

Then, if you wish, you can order what you want with the assurance you will know what to expect and when to expect it.

Many items are now available for immediate delivery, while others are still very hard to obtain. By checking with us, you will be able to intelligently plan your work on the basis of materials you will have on hand.

You know, of course, that Leich furnishes a complete line of supplies and construction materials. These are products of the highest quality, made by manufacturers well known to the telephone industry.

We will be only too glad to tell you honestly what we can do for you. You will not be obligated in any way. Why not mail us your list today.

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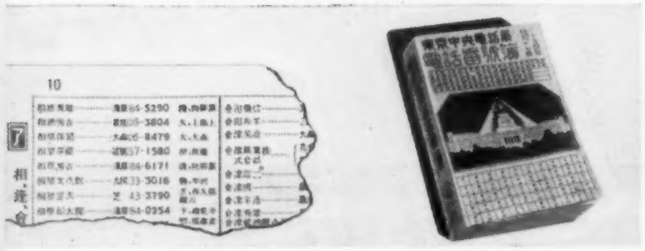
MANUFACTURERS OF TELEPHONES, SWITCHBOARDS AND RELATED APPARATUS SINCE 190

TELE-VIEWS

William L. (Moon) Mollands is Stromberg-Carlson's new telephone sales manager, Atlanta office.

J. W. Shipman, vice president of Automatic Electric Company, receives message of appreciation in form of a letter from Chiang Kai-Shek, from Dr. V. K. Wellington Koo, Chinese ambassador to U.S.A.

Daniel A. Sattler, manager of the Santa Barbara district of Associated Tel. Co., Ltd., recently retired after 47 years of telephone service.



Reed Whitaker, Atlanta, Ga., owns this main exchange Tokyo directory. Directory has over 150,000 listings.

Following retirement of Daniel A. Sattler, Associated Telephone Co., Ltd., appointed William Owen (left), manager of the company's West Los Angeles area, to new post as manager of Santa Barbara district. William T. Luck (right), of the company's general commercial department, became manager of the West Los Angeles area.

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STRONG, SOUND TIMBER . . . Southern Yellow Pine is especially adaptable to creosoting because of its enormous natural fibre strength, its straightness, freedom from knots and its cell structure that permits a deep and uniform penetration of preservative.

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Washington Budget Battle

WITH CONGRESS still at odds, as this was written, on the Federal budget ceiling for the 1948 fiscal year, the general situation does not look conducive to the FCC receiving what were deemed necessary funds in President Truman's budget message. Although the Senate policy-makers had raised their budget cut estimate $750 million, the House was still holding out for the full $6 billion slash it approved.

In either event, Congress will be hard put to meet its commitment, and the comparatively small dents made in the two major funds measures reported out so far by the House Appropriations Committee make that more apparent.

Interzone Interstate Hearing

IN THE slowly developing jurisdictional situation between the FCC and state regulatory agencies, the Federal commission has postponed its hearing on the suspended interstate interzone tariffs of the Chesapeake & Potomac Telephone Companies of Virginia and Baltimore City in favor of conferences with the three affected state commissions—Maryland, Virginia, and D. C.—on the issues involved.

Hearing on the case, which included two FCC orders, one suspending the disputed tariffs and the other a "show cause" dictum threatening prosecution of the C. & P. companies for not withdrawing the tariffs, had been scheduled for March 25. The FCC had attempted to make the proceeding a cooperative one with the state agencies, but the latter announced they preferred to intervene on the side of the telephone companies. After informal conferences in advance of the hearing date, it was decided to postpone the session and meanwhile attempt to work out a solution.

The chances are that the state commissions, who are contending that they have jurisdiction over interstate interzone exchange traffic in the so-called Washington Metropolitan Area, will stick to their guns, as they have the judicial precedent of the 1943 decision of a three-judge statutory court in a similar case involving Kansas City, Mo., and Kansas City, Kans. The FCC contends, however, that it should control the interstate traffic, and it suspended the tariffs filed by the C. & P. companies putting into effect rate increases approved by the Maryland and Virginia agencies.

Webster To Strengthen FCC

COMMODORE EDWARD M. WEBSTER, although he was approved by the Senate to fill the vacancy on the FCC late in March, probably will not take over the Commissionership until near the middle of April. The new Commissioner, who was drafted for the post by President Truman over his desire to remain in private employment, decided to fulfill his commitments to the National Federation of American Shipping, which he has been serving as Telecommunications Director, before moving into the FCC.

The naming of Commodore Webster to the Commission undoubtedly will strengthen that agency. A prewar Assistant Chief Engineer of the FCC, he served as wartime Chief Communications Officer of the U. S. Coast Guard, and, since his retirement a year ago, has been with the NFAS. He has participated in more than a score of international communications and radio conferences, experience which will be especially helpful with the Atlantic City World Conference coming up this summer.

Commissioner Webster's term—originally held by former Chairman James Lawrence Fly and his successor, Paul A. Porter—expires June 30, 1949. He becomes the fourth former FCC staff member now serving as Commissioner, the others being Chairman Charles R. Denny and Commissioner Rosel H. Hyde, ex-FCC legal chiefs, and Commissioner E. K. Jett, former Chief Engineer.

Meanwhile, in another personnel change at the agency, Chief Engineer George Adair has resigned to open offices as a radio engineering consultant. George Sterling, who has been Assistant Chief Engineer in charge of field and research activities, succeeds him April 30, when Mr. Adair's resignation is effective.

Telegraph Industry's Future

EVER SINCE the end of the war, when Western Union for the first time was faced with the headaches of domestic telegraph monopoly under peacetime conditions, speculation on the telegraph industry's future has been increasing in volume. It has risen through two rate increase orders by the FCC, with attendant traffic diversion to other media, a couple of whopping retroactive wage increases the telegraph company had to pay, and the present further wage negotiations with the AFL and CIO.

For the first time, in an FCC hearing on the company's program of closure of uneconomic offices or their conversion to agency operation, a high Western Union official was asked bluntly for his views on the industry's future. He was Walter P. Marshall, former Postal Telegraph official, whose importance in Western Union operations is indicated by the fact that he is Treasurer, Vice President in charge of the Contract Department, Assistant to the President, and a Director of the telegraph carrier.

Mr. Marshall declared he did not think the industry was dying, but that it requires substantial mechanization and modernization, and must advance in the fields of technology and electronics. He declared frankly, however, that with the continuation of existing manual methods of operations, the telegraph industry would be dying. He cited the need of improved pickup and delivery methods, pointing to telefax and the mobile delivery unit, the telecar. "We're in a high speed era," he declared, "and we can't expect the public to think of telegraph service as something fast when our symbol is a walking messenger."

Commission Establishes Rates For Pembroke, Georgia

The Georgia Public Service Commission, after reviewing application of Paul M. Beardslee and Ivy B. Beardslee, owners of the Pembroke (Ga.) Telephone Company, for authority to increase exchange rates and certain other charges for telephone service rendered in Pembroke and prescribed a new schedule of rates.

Testifying in support of his application, Mr. Beardslee submitted a statement of exchange operating revenue for the period May 1946 through November 1946 from which it appeared that a loss had been incurred each month. No allowance was made in this statement for depreciation reserve. He also testified that if the increases requested were granted the money would be used to rehabilitate the entire outside plant, replacing necessary poles and to provide for the elimination of open wire circuits by use of cable, all of which work he stated was being done not only to improve present telephone service but in anticipation of conversion to modern automatic dial service within the near future.

The loss as shown by the applicant for the seven months period, May through November, totalled $736.00 without any allowance for depreciation. On an annual basis this would mean an operating loss of $1260. In addition, an allowance for depreciation on any sort of book value would amount to at least $300.00, which means that the telephone company is now being operated at a loss of approximately $1500. annually without any provision for interest or return on investment.

A customer analysis made by the commission's staff indicated that the proposed rates for exchange service would increase the applicant's revenue approximately $150.00 per month. The rates provided, therefore, on the basis of the present number of subscribers, would not provide sufficient revenue to give the owners of the property a return on the investment but obviously additional business is available, and it is felt that a satisfactory return on the rates will result under proper operation and management.

The commission stated that rates heretofore applicable in the Pembroke exchange do not conform to the plan or method of rates prescribed by the commission and do not properly reflect the cost and value of the service rendered and received. "This can be illustrated," the order stated, "by the fact that the present rates do not contain a differential as between individual line and two-party service. Furthermore, the applicant has requested increases in extension rates, extra service and installation charges which are not in line with the charges allowed in comparable exchanges, and for that reason the petition of the applicant will not be granted but a new and more appropriate schedule of rates is herein prescribed which will provide the more satisfactory operating result above shown. Furthermore, the present extra charge of 15c for hand sets will be discontinued."

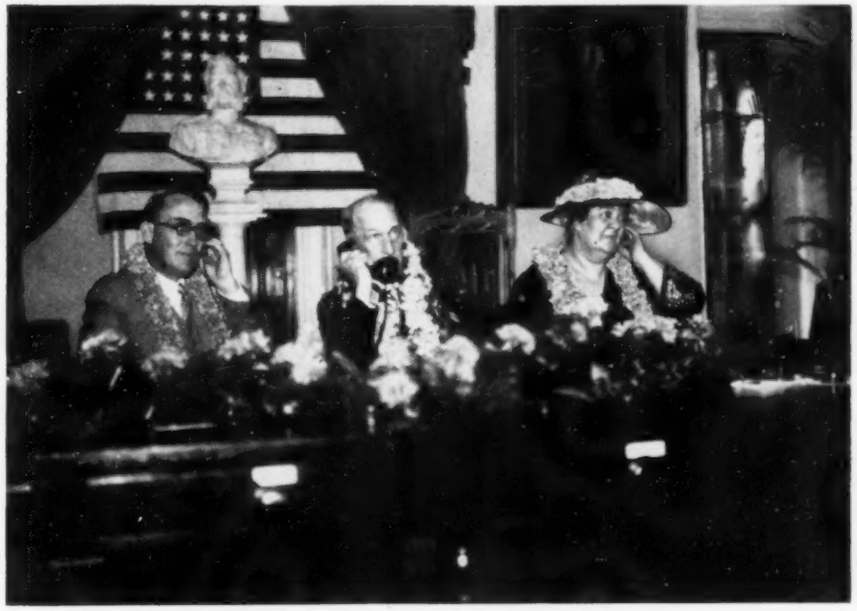
Maximum rates established by the commission for unlimited magneto exchange service in Pembroke and vicinity are:

Class of Service	Rate
Business Individual Line	$3.50
Business 2-Party Line	3.00
Business 4-Party Line	2.50
Residence Individual Line	2.50
Residence 2-Party Line	2.00
Residence 4-Party Line	1.75
Business Extension	1.25
Residence Extension	1.00
Extension Bells—	
Residence or Business	.25
Residence rural multi-party service:	
From City Limits to 2 miles beyond	1.75
From 2 to 4 miles	2.00
From 4 to 7 miles	2.25
From 7 to 10 miles	2.50
Business rural multi-party	1.00 additional

The rate for installation and extra equipment charges are as follows:

Type of Service	Rate
Initial Installation	$2.00
Transfer of Phone from building to building	2.00
Connection charge, where phone is already installed and no changes are made	1.00
Installation of Extension Phone	1.00
Installation of Extension Bells	1.00
Charge for changing type of phone to other than handset	1.00
Charge for changing type phone to handset	2.00

Old Photo Recalls Epic Communications Event

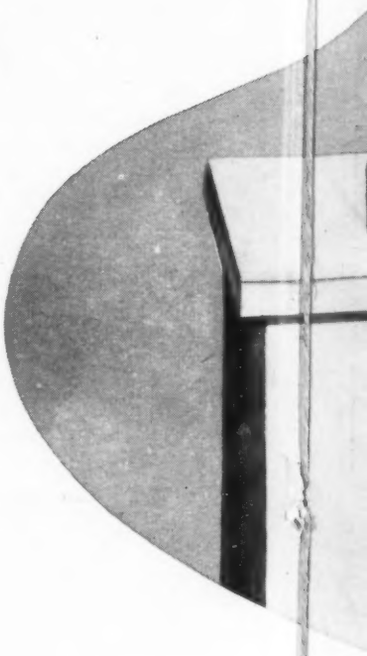


An epic event when taken, the above photo has become more historic in recent months. Shown here is the impressive inauguration of transpacific service by Mutual Telephone Company of Hawaii which took place 15 years ago in the Throne Room (only one in U.S.) of Iolani Palace in Honolulu. Now on the eve of statehood the same Throne Room is likely to see more epoch making events. Making this first Hawaii-to-Mainland call on Dec. 23rd, 1931 is the then Governor of Hawaii, L. M. Judd; John A. Balch, retired president and now chairman of the board of Mutual and Princess Kawananakoa, one of Hawaii's last members of the royal family. Mr. Balch's vision and foresight over long years of service with Mutual kept the company in the forefront of the world of radio-telephony. His determination to link the islands by voice was inspired when he first heard voice transmitted via radio telephone as far back as 1908. At that time he was operating one of Mutual's wireless stations and picked up a voice from a US Navy vessel some miles off Honolulu. In observing the 100th anniversary of Bell, Mutual's president, W. C. Avery pointed out that Hawaii had telephones only two years later and in 1880 King Kalakua, as one of thirty subscribers, had a telephone in the same Iolani Palace.

Another Automatic E

The RECORDER CONNECTING BO

for Telephone Conversation Recording



Again, Automatic Electric is ***first*** with modern apparatus to help you render a new and profitable service! Here, in a compact unit — about ringer-box size — is everything you need to provide conversation recording on your lines, using any standard make of electronic recorder designed for this service.

The Automatic Electric Recorder Connecting Box meets these four requirements:

1—For use on public telephone lines, it is sold only to telephone companies, for installation by telephone companies.

2—It is physically connected to the telephone line (replacing the usual connecting block).

3—It automatically sounds a distinctive tone as a warning that the conversation is being recorded.

4—It provides automatic volume control, so that the "home" telephone and the distant station are recorded at practically the same volume. This has been found to be essential for satisfactory "playback" of the recording.

The Connecting Box is simply wired into the telephone circuit between the telephone and the line, and is connected to the recorder by two flexible cords. Control is centered at the recorder, the warning tone starting automatically whenever the recorder is switched into service. Warning tone and automatic volume control are provided by standard radio tubes; the finished installation requires no more attention than an average radio receiver.

Preparations are now under way for early production to enable Independent operating companies to offer this modern service to their subscribers.

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Electric "First..."

BOX

THIS BOX PROVIDES:

- Automatic Warning Tone.
- Automatic Volume Control, for "balanced" recording.
- Physical connection to line.
- Easy installation — *by the telephone company.*
- Trouble-free operation.

The Automatic Electric Recorder Connecting Box may be used with any standard type of electronic recorder designed to give this service.

Progress of automotive industry is shown in above photographs. Top photo shows International auto wagon of 1907; bottom photo is International's KB-1 pickup truck.

MODERN TRUCK EQUIPMENT

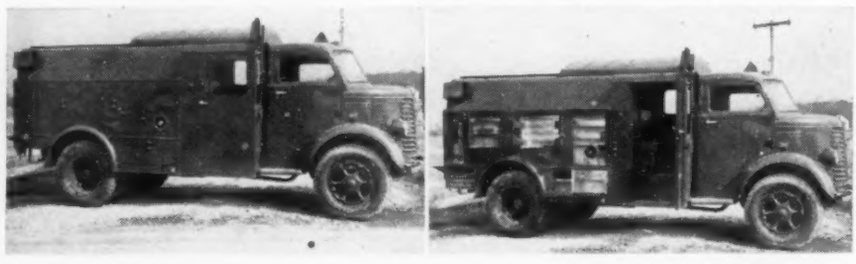
by JOHN G. REYNOLDS

Advancement of telephone industry closely allied with progress of automotive field. Today, telephone men look to modern truck equipment to boost speed of construction program.

LET DISASTER such as fire, blizzard, hurricane or flood—suddenly hit a community and residents of the stricken locality quickly realize how essential telephone service is to their normal way of life. At the same time telephone men who move in when disaster strikes and restore service as quickly as possible, realize the true value of the modern motorized equipment that makes possible the speed and efficiency of their work.

Even in the beginning of the telephone industry, faster means of transportation were constantly sought. First came the horse drawn "drop wagons", then the horseless carriage days of the International with a side crank and a small step to reach it, the Chase, Cadillac, Autocar, Reo, Whites, Diamond T, Mack and a host of others. The constant progress from the "horse and wagon" means of transporting men, materials and equipment, to today's highly efficient motorized units makes it evident that advancement of the telephone industry has been closely linked with progress of the automotive field.

The two industries will be even more closely allied during the coming months. And today, telephone men, realizant of the job lying ahead, are looking to their motorized equipment to help perform the gigantic task. Many companies are tackling their first full scale construction program since 1941. For the next several years the industry expects large construction programs which in addition to providing facilities for new subscribers and reestablishing new



LCW 102 line construction truck with crew compartment made by the York-Hoover Corp.

margins of spare plant will also put into effect many improvements necessarily postponed because of war.

THIS WORK will take trucks—new trucks to replace many of the vehicles that have put in their years' of service and can no longer be counted upon to efficiently assist in performance of the task ahead. If your equipment has reached that wheezy stage when it's a question of whether parts of it will reach the garage at night or expire suddenly in front of Uncle Moe's Junkyard, there is no better time than now to consider the new equipment that is available.

Today, as at no other time, your company can obtain modern automotive equipment that is capable of performing a broad range of functions in addition to usual transportation duties. These additional services of a more or less special nature are made possible by adaptation of generally available car and truck chassis. The power of the truck engine is utilized to drive a variety of types of special auxiliary apparatus, and motor vehicle bodies, in general, are designed to suit the particular requirements of the classes of work done by the men who use them.

Your motor vehicle requirements may vary from those of other companies as to kinds of auxiliary apparatus, and types and sizes of vehicle bodies. However, the minimum number of types of special telephone vehicles which are required, plus the number of makes of chassis, result in numerous combinations and it is possible to find just the combination for your particular requirements.

PRESENTLY POPULAR in the field are the large supply delivery trucks, ½ ton light installation trucks, cable and line maintenance trucks on one-ton chassis, light construction winch trucks on 1 ½-ton chassis. In recent years there has been a great increase of ½-ton vehicles; 1 ½ ton trucks and passenger cars have reflected smaller increases while other sizes of trucks have remained practically unchanged except for the 2 ½-ton size which has shown a slight tendency to decrease.

The modern trend is toward selection of a seemingly lighter class of vehicle than it has been customary in the past to use for the job. Experience has proved that where this is done within reason the costs should be lower and yet the performance and usefulness of the unit should be better than with the replaced truck.

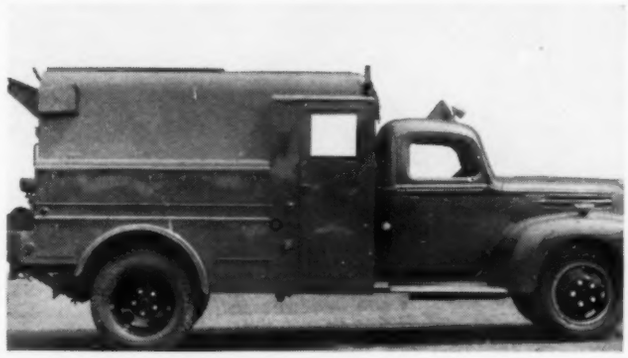
A consideration, in discussing types of chassis, which may pay you large dividends in the future, deals with obtaining trucks with adequate power for the operating conditions. Present-day highway traffic conditions and vehicle designs suggest that in the future minimum power-load factors (horse power for load carried) may be required for all vehicles. This matter is not as important in level territories as in areas where hills are encountered. But in all cases, when selecting vehicles, care should be taken to secure adequate engine power with suitable available gear reduction.

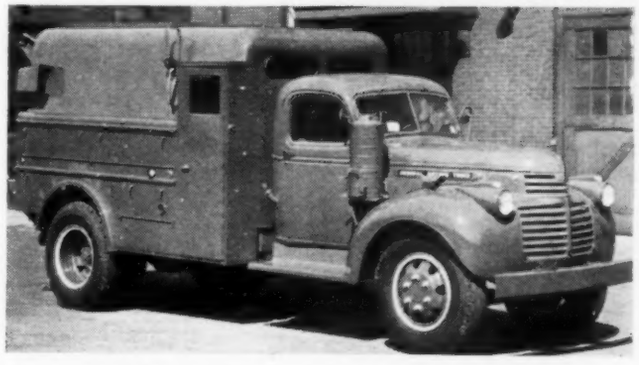
Another point in connection with selection, is a proper understanding of standard and optional parts of the equipment. Many things about a telephone truck are generally required. Tools and material compartments may be considered as standard requirements. But other items might or might not be required on the truck and these are dependent upon your own local conditions, the work to be done and future plans of your individual company.

For example, in some localities a ladder platform might be considered as an optional item for a cable and line maintenance truck. In other localities the platform might be a necessity. It is important that in securing new automotive equipment, the optional items be carefully scrutinized to make sure that those ac-

Top—American Coach & Body Co.'s DT-132 Standard line construction truck.

Right—Type B-4 132 standard line construction truck with 4-man crew compartment in body. (American Coach & Body.)





Type B-4 132 body, manufactured by American Coach & Body Co.

Engineering
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and
Maintenance
of
Outside
Telephone
Plants

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We can handle any job —

NEALE
CONSTRUCTION CO.
Topeka, Kansas

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RICHARD D. CROWE
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CENtral 6505

Action shots of Highway Trailer Co.'s "HD" earth boring machine. Machine has integral winch and derrick which enables operator to set the poles as well as dig the holes.

tually required for the job are ordered, and that those not needed are omitted, since each additional item adds to the cost of the unit.

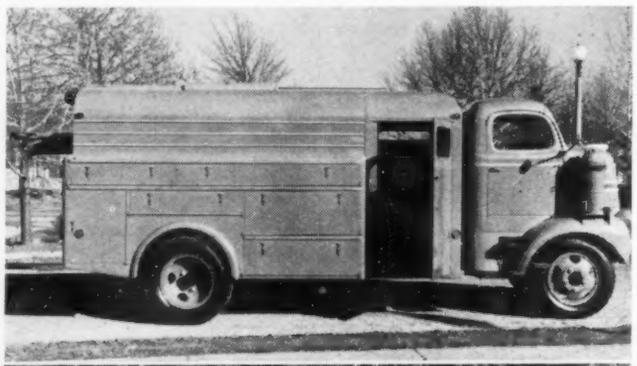
It is also desirable to select chassis for use with new truck bodies and their associated equipment, which will last long enough so that the entire unit will be ready for retirement at one time. This selection procedure will save the considerable cost of transferring equipment from one chassis to another.

Other points that should govern selection are:

(1) Adaptability of Truck to Work. Under this heading consider ability, speed, brakes, ease of handling, traction, suitability of the commercial chassis to take the equipment which is special to the telephone field such as auxiliary power apparatus, telephone bodies and cabs which may be special, apparatus for trailer applications, adequate carrying capacity, chassis weight as light as practicable, and appearance.

(2) Reliability.
Consider quality of design, materials and construction, which affect freedom from repair delays and thus assures the continuity of service to subscribers.
Under reliability, of course, comes consideration of the manufacturer's organization, including the distributors of the trucks. Factors involved are stability, extent of repairs

(*Please turn to page* 93)



Top, McCabe Powers Series 600C line construction and general maintenance body.

Bottom, McCabe Powers 25-T telephone maintenance and general service body.

MANAGEMENT Quickie

Reading Time—15 Minutes

Service Upgrading (Second Section)

IN SCANNING the rate schedule for upgrading prospects four party residence service naturally follows rural switching service. With properly gauged differentials this class always contains prospects for service upgrading. Subscribers who have four party (five party where available) move into another part of the city. At that time the advantages of better service can be best presented. Under war conditions the new subscriber was assigned any service available even when a higher grade of service was desired. Such emergency classifications are upgrading prospects in post war conditions. The completed service order file will disclose their identity. While increasing revenue, upgrading of four party residence service is often beneficial from the standpoint of plant relief. Speaking generally it is advisable to begin upgrading of all service possible when the ratio of telephones to working lines is advancing toward three or more.

It cannot be stated too clearly, however, that in any upgrading step the rate differential must be satisfactory. A change in any differential must involve the increase of at least one established rate. This can be effected, of course, only under the authority of the regulatory authorities. That means a formal rate case. If any given differential is not adequate to justify upgrading it is not adequate for other reasons and should be set out for future revision. Under such conditions an effort should be made to gradually eliminate the connection of new subscribers at the higher rate. This will afford an opportunity to correct the discrepancy by formal rate adjustment proceedings when the opportune time is reached. The design of a satisfactory tariff, however, is another matter. It will be discussed in a future section of this series. The remarks on service upgrading are fully applicable only when the rate schedule is well balanced. Subsequent adjustments of the rate schedule, under those conditions, will not disturb the service distribution. It is obvious that no effort should be made to increase the number of subscribers, at any time, who are classified in a grade of service for which the rate is unsatisfactory.

Modern two party selective residence service is an excellent one. It is so desirable that it can readily be sold to many subscribers receiving four party service. With a suitable rate differential in force between the two party and the individual residence, two party service can be safely recommended. In many telephone systems there is too large a proportion of four party subscribers for efficient operation. A reduction in this number and their transfer to better classifications is the solution, at least in part, of some plant problems.

Before considering the task of service upgrading completed the individual residence and business subscribers must be studied. The individual residence service, obviously does not afford much scope for service upgrading. The sale of extension set service can often be made to subscribers in this classification, however. The individual business service is a proper field for intensive consideration. Many subscribers are attempting to conduct their telephone business over a number of extension sets. When the comparison is carefully worked out between such arrangements, with the almost inevitable wiring plans included, and suitable private branch service it is often surprisingly easy to secure a contract for the improved service. This type of service sales is, however, not to be attempted on a hit and miss basis. Preliminary studies showing the many advantages of the proposed service *for the subscriber* are required. Careful thought should be given to the increased facility of *intraoffice* communication with private branch equipment.

The subscriber will be pleased, in most cases, to discuss the feasibility of making his telephone service more efficient. A personal interview or two will develop the facts applicable to the individual case. When more than two extensions are connected to one circuit the situation is one for upgrading study. It is a sales matter, however, and success will be attained only when the facts of the individual case have been intelligently analysed and presented. If the upgrading is not found to be possible the subscriber will appreciate the attention given to his requirements. To that extent public relations will have been improved.

In many telephone systems there is an effective differential between the rate for service with a wall telephone and service with a hand telephone. Merely calling the subscriber's attention to the present availability of the more modern hand set at a slight increase in the rate, in any service classification, will very often result in upgrading. The elimination of extremely long cords for hand sets or desk stands

by the installation of an extension set can often be sold by a tactful presentation of the dangerous character of the extremly long cord.

Many upgrading suggestions are made possible by the inclusion in the tariff of proper rules. Like the differentials when the rules are inadequate they should be set out for future revision. This is a part of the formal rate case and is important from the standpoint of revenue. In other words the rules should be such as will have the effect of safeguarding the minor sources of the company's revenue.

NOTE: *Space requirements prescribe condensation of this material. Reader's time economy demands brevity. If you are not clear on any point or take exception to any statement you will confer a favor on the author by writing for consideration of your opinion or further expansion of the text in the interest of clarification. THANKS.*—**JAY G. MITCHELL.**

◆

Continental Farm Machine's Post Hole Digger

The progress of the Continental Farm Machine Company, Minneapolis, Minnesota, in manufacturing equipment for the telephone field began with the development of the company's farm model digger. At that time the company was working toward the perfection of a posthole digger that would offer the farmer advantage in reducing or eliminating his post hole problems and help him to plan his fencing work more effectively.

Success in this field has proved very gratifying. The company found that certain features of its machine, such as it's ready adaptability to any make of tractor, the automatic control and ease of installation made the Model "B" popular from the very start. They also learned that many of the units were being used by small and even large telephone companies to dig holes on their line installation and service work. This discovery lead to the company's development of a light, portable equipment designed for successful earth boring work at a cost within the reach of both large and small companies.

Through the cooperation of several telephone companies that presented their problems and helped continental engineers work out the 'bugs' from the first models, Continental is now able to present to the telephone industry a tried and proved product. Continental's new plant in Belton, Texas, is now dedicated to the production of equipment for telephone use.

Continental now has in production and is making delivery of four models of machines to fit the requirements and budgets of any telephone company. The fundamental parts have all been standardized and with four different types of mounting, the machines can be installed on any type of tractor, truck or Jeep with power take-offs. Prices range from $192.50 to $785.00 with augers running from 4" to 14" in diameter, and depth from 44" to 72". Information on the proper model to fill certain needs can be obtained by writing direct to the Continental Farm Machine Co., 1124 Metropolitan Life Bldg., Minneapolis 1, Minn., or the Continental Belton Co., Belton, Texas.

The Continental digger goes into action by simple, one-hand operation.

STROMBERG—

copperweld wire

means greater strength, conductivity, and permanence!

Copperweld provides every desirable feature in telephone wire—the high strength of alloy steel, combined with the high conductivity and better transmission of a thick, protective covering of copper permanently molten-welded on.

This means that long spans are perfectly safe, and maintenance costs are reduced to a minimum.

Copperweld has the best electrical conductance of any high-strength conductor—is 2 to 3 times stronger than hard-drawn copper wire, and has greater tensile strength than any wire of comparable electrical properties.

For long life and long spans, specify Copperweld . . . the wire that gets the message through!

STROMBERG—

BRANCH OFFICES: CHICAGO 6, ANSA

RG–CARLSON *Recommends*

reliable zinc cable hangers

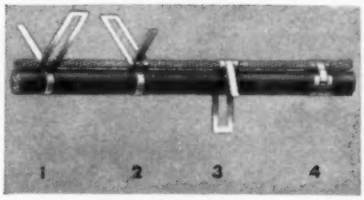
INSURE NO SHEATH CUTTING

NO CREEPING

NO RUSTING

Even badly worn cables hung with Reliable Zinc Cable Hangers will last much longer. The reason is merely that all cable movement that results in wear and sheath cutting is eliminated, because the cable is rigidly bound to the messenger. This is also an added lightning protection—a solid ground is established between messenger and cable.

Reliable Zinc Cable Hangers are strong, economical, and easy to install.



The four simple steps above clearly illustrate the simplicity of a Reliable Zinc Cable installation.

"RELIABLE" ***Identifies the Quality***

armstrong's *glass insulators*

STRONGER THAN SUPPORTING PINS!

Both in laboratory tests and in actual use, Armstrong's Glass Insulators have consistently proven stronger under transverse strains than the pins which support them!

This superlative quality is no accident. For more than 24 years, Armstrong's Insulators have embodied the finest in glass-making know-how.

Proof against every extreme of weather, these insulators also discourage malicious breakage. Crystal-clear, they are practically invisible against the sky.

Proof of their quality is the fact that leading communications systems all over the globe specify "Armstrong's" when buying glass insulators.

They conform to—or exceed—A.S.T.M. standards

subscriber service improves with sturgis standard

Calm, unruffled subscriber service prevails when operators are mentally and physically well-poised.

Operators call the Sturgis No. 435-A "comfortable", unconsciously recognizing that it conserves their vitality. True, its ample Saddle Seat (16½" wide, 14½" deep), and ample Plaited Backrest (8" high, 13" wide), spell comfort. But their infinite capacity for inter-adjustment in height and depth to correctly posture operators of every type of figure is their pay-off.

Heavy, welded steel tubing (1" O.D. for base, ¾" O.D. for footrest), makes Sturgis frames indestructible. Their hair-filled genuine leather upholstery wears everlastingly.

Company, operators and subscribers profit from Sturgis correct design.

Chair Height Specifications

Seat Height Adjustment	Footrest Height From Floor	Seat Height Adjustment	Footrest Height From Floor
18" to 22"	5"	24" to 28"	10"
20" to 24"	6"	26" to 30"	12"
22" to 26"	8"	28" to 32"	13"

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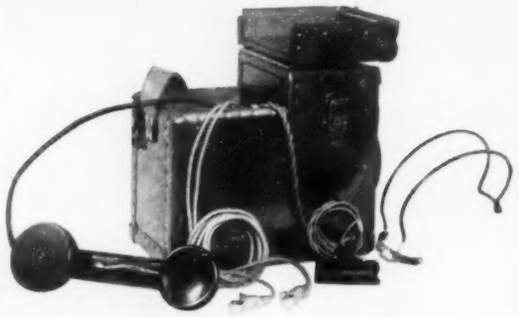


★ TELEPHONE ENGINEER and MANAGEMENT'S

PRACTICAL--

"HOW TO DO IT"

SUGGESTIONS . . .

GUYING . . .

PROPERLY designed anchors take care of adequate guying demands today and the use of a "dead-man" made of a short section of wooden pole in some cases is rapidly being discontinued. The screw, expanding and plate type anchors are now familiar items to every telephone man.

The popular expanding anchor is unsuitable for rocky soils or soil which will not allow it to properly expand. The cone anchor is right at home in rocky earth and dry hard soils. The plate anchor claims an advantage in that the anchor plate pulls against undisturbed earth. For territory where the soil is moist or swampy the screw type anchor does the job to the well known "T".

◆

PUBLIC TELEPHONES . . .

IT HAS been truthfully said that the "public telephone man" is responsible for seeing that "the world and his wife can always find a public telephone handy." To provide the public with coin

telephone service, every manager realizes the service is more costly to install and operate than ordinary service and therefore collection costs must be kept moderate.

Since the coin receptacle will only hold so many coins and no more and a "full box" means that the telephone will not work, the collector must hit each box when it is reasonably full. Proper scheduling of collections is essential if the job is to be done economically. Since some telephones are used incessantly while others are used relatively little, large companies have found a "skip-stop" collection procedure is more economical and these facts govern collection routes.

(1) Of two telephones in the same store an inexperienced collector might say "collect them both at the same time". The experienced man knows, however, that in most cases the telephone nearer the door is used most often and therefore must be collected more frequently.

(2) There are seasonal variations in usage; winter schedules must be modified when summer comes.

(3) A public telephone along a railroad, streetcar line, will hold more coins than a coin box in a store on a quiet block. Reason: Vibration from passing trains causes coins to pack closer together.

◆

BURIED WIRE . . .

THOUGH the urge to put telephone lines underground is only slightly younger than the telephone business itself, the job of developing buried wire as a practicable plant instrumentality is relatively new. An old timer sends in these suggestions for those considering the use of buried wire.

(1) One of the principal problems is splicing. The splice must be as resistant to water absorption as the wire itself.

(2) In choosing routes for buried circuits choose routes that commonly have a number of party line subscribers; each subscriber being bridged on the buried circuit.

(3) It is preferable to follow the route of existing public roadways; laying the wire in the shoulder of the road.

(4) Buried wire is not a serviceable form of construction through a terrain where nested boulders are frequently encountered.

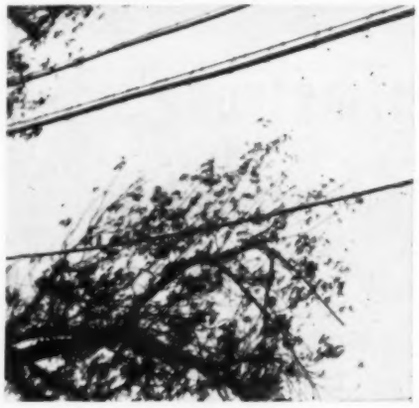
(5) Where more than one wire is buried at a time the crosstalk problem can be avoided by the introduction of twists every few feet, either by twisting wire in process of laying or having it pretwisted on the reels. The twists reduce crosstalk to low value.

(6) Keep accurate records of buried wire routes and have precise methods of tracing the underground path. Putting a tone current on the wire and following along the ground's surface with an exploring coil is one way of tracing the path.

◆

ELIMINATE POTENTIAL CABLE TROUBLE . . .

EVERY telephone man with a few years experience under his belt knows that sheath breaks in both aerial



and underground cable plant can, as a rule, be credited to one or more of the following:

Aerial Cable—Ring cuts; pin holes; breaks due to buckling and bowing; bullet holes; splicing defects, or manufacturing defects.

Underground Cable—Breaks at duct entrances; breaks due to poor arrangement in manholes; snagging cable while pulling; electrolysis; foreign companies' workmen; splicing defects, or manufacturing defects.

A preventative maintenance plan which will aid in eliminating the above listed potential trouble consists of 11 points. Namely:

(1) Gas pressure testing.

(2) More care in racking manholes.
(3) Extensive electrolysis surveys.
(4) Educating employees in handling cable.
(5) Frequent manhole inspections.
(6) Frequent inspection of rural routes.
(7) Pulling and splicing cable at such tension as will insure elimination of trouble due to bowing.
(8) Erecting strand at proper tensions in order to procure proper sags.
(9) Close observations of work being done by foreign companies' workmen along routes paralleling telephone plant.
(10) Filling sleeves on exchange cables with paraffin.
(11) Proper engineering to warrant cables being free from trees, fire hazards, and other sources which might cause interruptions.

◆

EXPLORING COILS . . .

IF A cable wire accidentally contacts the cable sheath or another wire, the time-honored procedure is to locate the fault by a "Murray" or "Varley" loop test using a Modern Wheatstone Bridge to measure the resistance of the faulty wire from one end of the cable to the fault. The result of the test is then translated into distance, so many feet to the ohm for each gauge of cable in the loop and the location is spotted on the cable record map. Providing measuring conditions are favorable, the location obtained is accurate within perhaps 50 feet.

If the cableman can find the trouble by inspecting the cable in the area indicated, all is well. However, if there is no indication of the trouble point, the experienced cableman will use an exploring coil to locate the trouble, and thus avoid making several sheath openings to find the trouble.

The exploring coil method utilizes a tone source, connected to the wire at one end of the cable. The tone source causes an alternating current to flow along the wire through the fault and back. At any point between the tone source and the fault, the magnetic field produced by the current will induce a current in the coil and associated telephone receiver. On the far side of the fault the tone current will not appear at all or very weakly. Thus by applying the coil at various points along the cable and comparing the tone volumes, the location of the fault can be determined.

◆

POLE SETTING . . .

ORDINARILY a "sand barrel" is used to set poles in sandy soil that requires shoring to prevent caving of the soil. If, however, you desire a quicker method, and if you have qualified powder men to do the work, we suggest the following procedure:

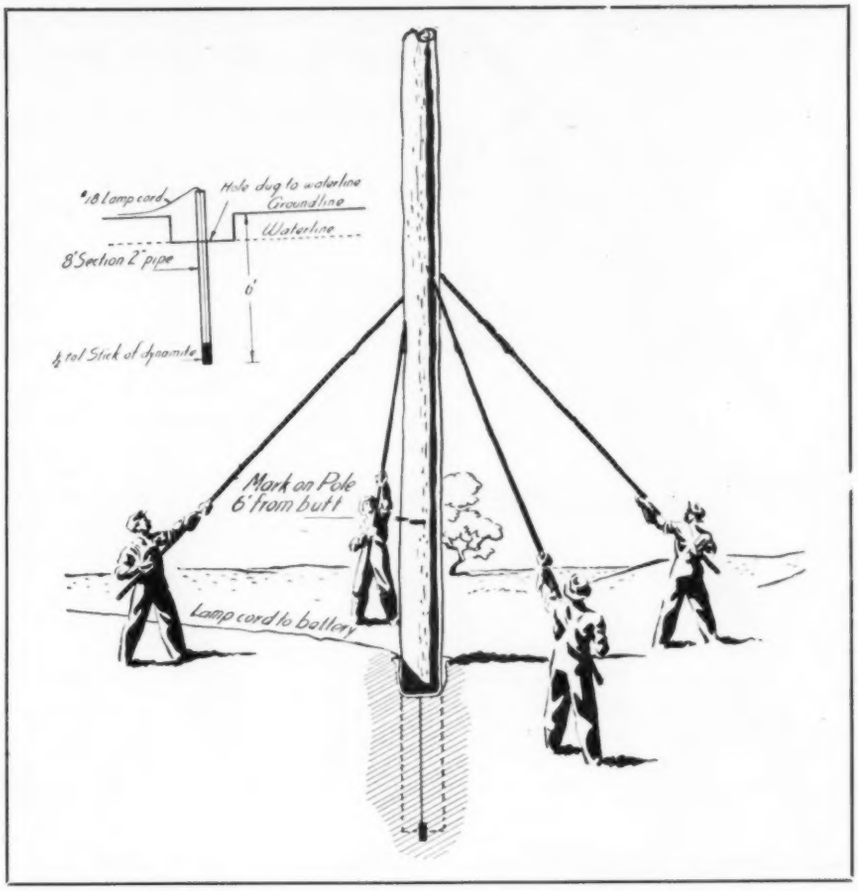


Fig. 1—Method of setting poles by dynamite.

Dig the hole to a depth where water begins to seep in the hole, or until the soil begins to cave. Drive a length of 2-inch pipe into the hole, at its center, to the desired depth for the pole butt. Insert one-half to one full stick of dynamite (according to soil condition and depth) with cap in place, using the lead wires to lower the charge to the bottom of the pipe. Place a stick of wood inside the pipe to hold the charge in place, while the pipe is being withdrawn from the hole. Take the leads out of the pipe and connect them to the battery and plunger ready for the firing of the charge. Set the pole inside the shallow hole over the dynamite charge and have the men hold the pole in place with pikes, as illustrated in Figure 1.

When the charge is fired, the pole will drop to the depth at which the charge was placed. It may be necessary to shoot a second charge once in a while, but usually the pole drops to the right depth the first time. If the work is handled by qualified powder men, there is no danger involved, as the dynamite charge is placed too deep to result in nothing more than a dull thud and throwing water a foot or so out of the hole. (We are indebted to the Line Material Company of Milwaukee, Wisconsin for this method.)

◆

DROP WIRE HINTS . . .

SINCE maintenance expense on drop wires, as reported by one large company, approximates 19% compared to 5% for toll aerial wire, proper drop wire and maintenance programs and instructions are necessary. These procedures are proving out for many companies.

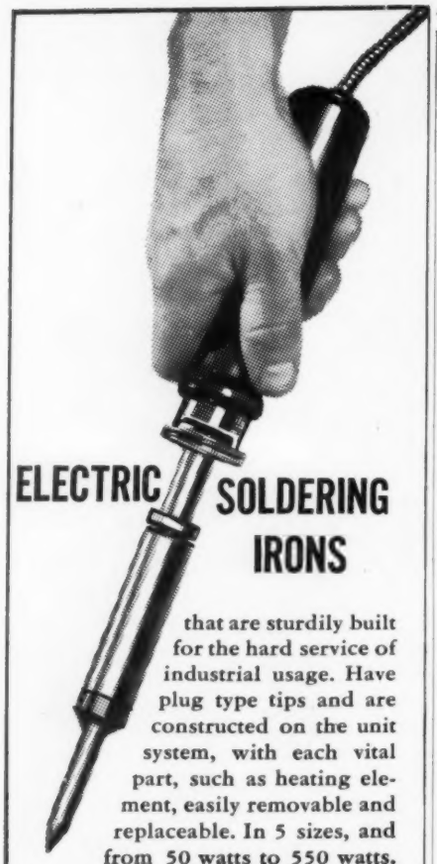
(1) Route drop wire runs from pole to house to avoid trees and buildings.

(2) Make drops conform to same clearances as open wire.

(3) Use compression type single tube sleeves to make drop wire splices.

(4) Use porcelain insulator to insulate drops attached to wooden buildings.

(5) Use woven fabric conduit or plastic guards to protect drop wires from damage where runs through trees are unavoidable.



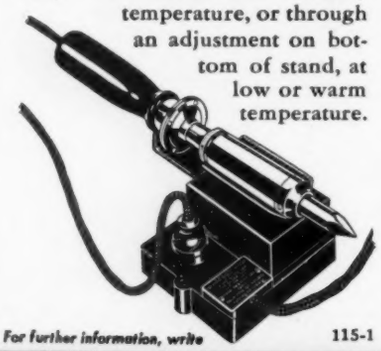
ELECTRIC SOLDERING IRONS

that are sturdily built for the hard service of industrial usage. Have plug type tips and are constructed on the unit system, with each vital part, such as heating element, easily removable and replaceable. In 5 sizes, and from 50 watts to 550 watts.

American Beauty

TEMPERATURE REGULATING STAND

This is a thermostatically controlled device for the regulation of the temperature of an electric soldering iron. When placed on and connected to this stand, iron may be maintained at working temperature, or through an adjustment on bottom of stand, at low or warm temperature.



For further information, write 115-1

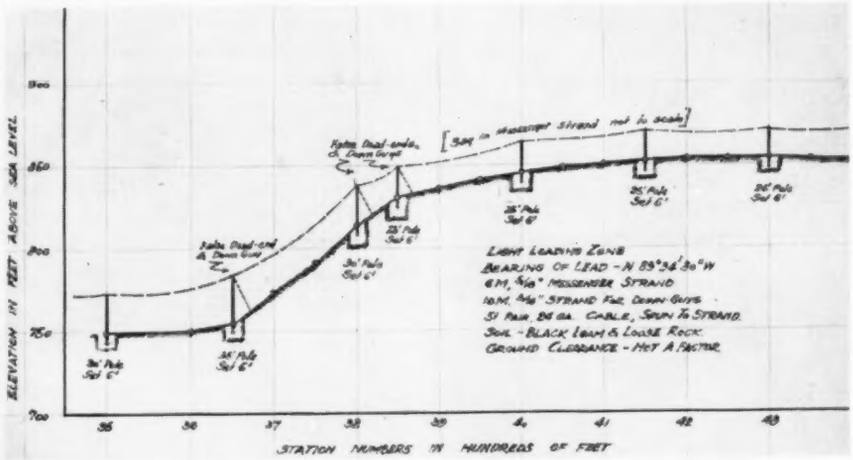
AMERICAN ELECTRICAL HEATER COMPANY
DETROIT 2, MICHIGAN
established 1894

NEALE-TYPE Spinner Insures Proper Tension on Spinning Wire

By JAY G. MITCHELL

THE FOLLOWING question and our answer covers a problem that may be common to many other companies during the spring construction activity.

Q. We desire to have you review our plan for the placing of an aerial cable at one of our exchanges since it involves taking the cable up a hill that rises 110 feet vertically in 600 feet horizontally. The conditions are shown in the attached profile drawing.


ELEVATION IN FEET ABOVE SEA LEVEL
STATION NUMBERS IN HUNDREDS OF FEET
LIGHT LOADING ZONE
BEARING OF LEAD - N 89°34'30"W
6M, 7/16" MESSENGER STRAND
10M, 7/16" STRAND FOR DOWN-GUYS
50 PAIR, 24 GA. CABLE, SPUN TO STRAND
SOIL - BLACK LOAM & LOOSE ROCK
GROUND CLEARANCE - NOT A FACTOR

Cable placing job involves taking cable up a hill that rises 110 feet vertically in 600 feet horizontally.

The cable will be a 50 pair, 24 gauge. However we are attempting to set the lead in a position and with sufficient strength to support larger cables when they are required. We propose to use 6 M messenger strand, with 10 M strand on the downguys, A. T. & T. specifications. Angle eye bolts will be used for the downguys and rock anchors are proposed. The cable will be spun in position with the Neale cable spinner. Grade clamps will be used if found necessary.

A. This question is one which requires only an expression as to the advisability of using cable lashing methods in a run which, as shown by the cut, includes steep grades. These grades would require the installation of grade clamps under conditions in which rings or straps were employed. At one point the grade reaches a value of more than 33⅓%. Because there are certain important features in the application of the spinning method of cable support on steep grades it is absolutely essential that the requirements be thoroughly studied. The use of the Neale type of spinner insures the possibility of maintaining a tension of from 30 to 40 pounds on the spinning wire and this is essential to insure that the cable is held snugly against the messenger strand so that slippage cannot occur. Spinning must start at the top of the hill and proceed downhill. The termination of the spinning wire **must be made in accordance with the technique approved by the manufacturers of the spinner.** The spinning wire must follow the lay of the strands of the messenger also to insure against slipping. The entire spinning method of cable support is, so far as can be found by inquiry, satisfactory and reduces the first cost of completed cable plant somewhat over other methods. However the grade shown in the inquiry cut is a steep one and it is suggested that a few grade clamps be installed on the first run of cable up the hill. These may not be needed but the first run of cable can be watched on the grade and in a short time it will be apparent whether they should be included or omitted on other runs.

◆

A. B. Cooper Sells Exchange

A. B. Cooper has sold the Burbank (Okla.) Telephone Exchange to **L. A. Burling.**

The exchange had been owned and operated by Mr. Cooper for 20 years.

THE NEALE MODEL "B" SPINNER · · · AND ACCESSORY TOOLS

THE GROUP OF CABLE SPINNING TOOLS SHOWN ABOVE REFRESENT SEVERAL YEARS OF CONCENTRATED EFFORT, DEVELOPING AND PERFECTING EQUIPMENT FOR A METHOD OF SUSPENDING AERIAL CABLE THAT REDUCES INSTALLATION COSTS, PROVIDE LONGER CABLE LIFE, WITH LOWER MAINTENANCE COSTS.

Our Spinner and accessory tools can be relied upon to give years of service. The Model "B" machine has a strong steel frame supporting a comfortable safety seat. The geared chain drive enables the operator to ride up grade to the pole and automatic ratchets prevent any backward movement that would put slack in spinning wire.

By riding the Spinner, you have complete control of your job at all times. The operator is in a position to observe the condition of the cable and strand and mark any defects for future attention.

With these facts before you — we cordially invite your inquiries through your jobber — at once.

CABLE SPINNING EQUIPMENT COMPANY

432 WEST CRANE, TOPEKA, KANSAS

★ PART THREE

Fig. 12—Typical Wheatstone Bridge.

MODERN TESTING INSTRUMENTS

by

B. C. BURDEN

IN PART III of the series on "Modern Testing Instruments" Mr. Burden discusses use of the Wheatstone Bridge for locating faults in a telephone cable. His discussion of the Varley method and the Murray method reveals the true value of each system.

ONE OF the oldest of the testing instruments used in the telephone field is the Wheatstone bridge (See Fig. 12). The bridge is primarily a resistance measuring instrument, but is especially adapted to the location of faults in telephone cables and open wire. It has the distinct advantage, as compared to direct reading ohmmeters, of giving fault indications which are independent of the resistance of the fault itself. The basic theory of the Wheatstone bridge is so well known and has been covered so frequently that it will not be repeated here.

When the bridge is used for the location of faults in a telephone cable, there are two methods of application. One is known as the Varley method and the other the Murray method. They differ primarily in the manner in which the ratio arms of the bridge are applied in the testing circuit. The Varley method has some advantages over the Murray method for the location of grounds, shorts, crosses, etc. and its use is recommended. The Murray method is useful in the location of opens.

The Simple Varley Method

THE SIMPLEST arrangement for the location of cable faults with the Wheatstone bridge is in the simple Varley hook-up shown in Fig. 13. The location of faults with the Wheatstone bridge requires that a *good conductor*, that is, one free of trouble, be employed with the conductor on which the fault is known to exist (*bad conductor*). The good and bad wires, as they are called, are connected to the bridge as shown in Fig. 13. They are also connected together (*strapped*) at the first cable terminal in which they appear and which is known to be beyond the point at which the fault exists. The *ratio arm* of the bridge must be set for a ratio of 1.0. After all connections are made the rheostat arm of the bridge is adjusted to balance the bridge. This is shown by a *null* (zero) deflection on the galvanometer. The resistance of the bad wire from strap back to fault is then easily computed by simply dividing the rheostat arm setting by two,

$$\text{i. e., } X = \frac{R}{2}$$

Where: X—resistance in ohms of bad wire from strap back to fault and R—setting in ohms of the rheostat arm.

With the simple Varley method it is necessary that the good and bad wires have approximately the same resistance. This means that they must at least be in the same cable and preferably they should be wires of the same pair. Ordinarily on aerial cable it is satisfactory if the good wire is in the same cable with the bad wire even though not a mate of the bad wire.

Effect of Fault Resistance

THE FACT that the resistance of the fault will not affect the accuracy of the measurement, if the fault resistance is not excessively high, is shown by Fig. 14. In this figure the good and bad wires are shown as lumped resistances in the arms of the bridge in which they appear. The fault is the point at which current is introduced to the common

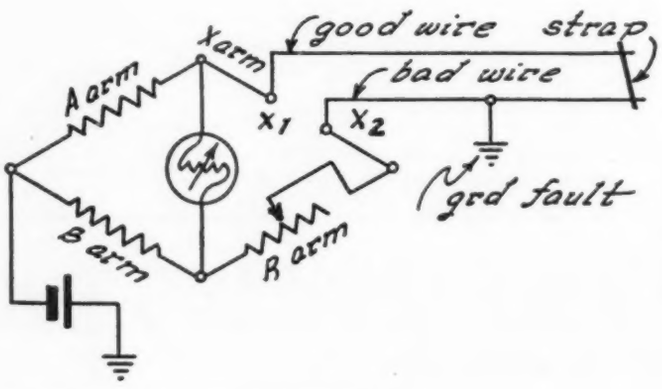


Fig. 13—Connections for Simple Varley Fault Location Measurement.

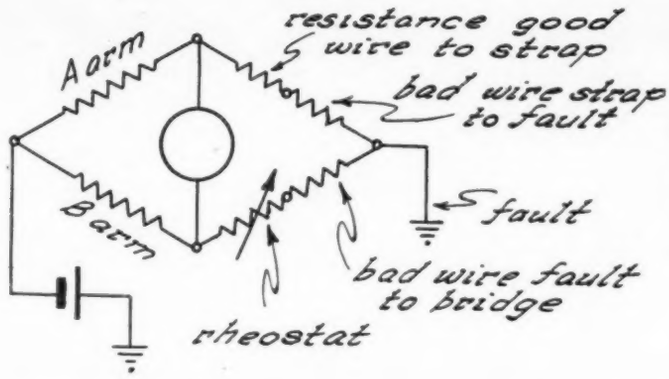


Fig. 14—Schematic of the bridge arms set up for a three-varley test.

arms of the bridge. A study of this figure will reveal that the fault resistance is common to all arms of the bridge, hence can have no effect on the accuracy of the bridge readings. Resistance in the fault merely limits the amount of current that flows through the bridge arms.

In general, fair accuracy can be obtained on faults whose resistance is as high as 100,000 ohms. With care good results can be obtained with fault resistances as high as 500,000 ohms.

Determining Fault Resistance

WITH the resistance of the bad wire from strap back to fault known, it is relatively easy to determine the actual distance in feet. This is done by simply multiplying the resistance in ohms from strap to fault by the *feet-per-ohm* value for the particular cable involved. Table No. 1 (page 90) gives conversion data for common sizes of telephone cable.

The Three-Varley Fault Location Method

FOR the most accurate fault location work using the Wheatstone bridge, the three-Varley method is preferable to the simple Varley method. Its advantages are: (1) unequal ratio arms can be used which permit readings to a fraction of an ohm. (2) the good and bad wires need not have the same resistance, hence, need not even be in the same cable, (3) a check reading is obtained which tends to minimize errors. The principal difference between the simple and three-Varley methods is that in the three-Varley method two good wires are required and three separate readings are obtained. These readings are inserted in several simple mathematical equations which give the fault location in terms of resistance from strap to fault and from bridge to fault.

Figure 15 illustrates the connections for obtaining the three readings. In the first step, *good wire No.* 1 and the *bad wire* are connected to bridge terminals X_1 and X_2. *Good wire No.* 2 is connected to the ground terminal of the bridge. The two good wires and the bad wire are all connected together at any terminal known to be beyond the fault. With the ratio arm set on 0.1 the rheostat is adjusted to balance the bridge. This rheostat reading is known as R_1.

The connections are then changed as shown in step 2. In this step the ground terminal is disconnected from good wire No. 2 and connected to ground. The bridge is again balanced (with the same ratio dial setting) and this reading is called R_2. A third reading is then obtained (step 3) with the battery wire connected to the junction of the R and X arms (the normal connection for measuring resistance). The same ratio dial must be used for this reading as for the first two. It is essential that the *same ratio dial setting be used for all three readings.*

After the three readings are taken, the resistance from *strap back to fault* is found by the equation:

$X_1 = .0909\ (R_2 - R_1)$ In other words subtract the first reading from the second and multiply by the decimal constant .0909. This computation may be checked by the equation:

$X_2 = .0909\ (R_3 - R_2)$

This gives the resistance in ohms of the bad wire from the *bridge to the fault.* The two readings should equal the approximate overall resistance of the bad wire. Fig. 16 (page 90) shows how the resistance of the bad wire may be measured.

Miscellaneous Data on Bridge Location Methods

MANY WIRE chiefs shy away from the use of the Wheatstone bridge believing it to be too complicated and subject to error for fault location work. The Wheatstone bridge is a highly precise instrument and any error that results from its use can generally be traced to a lack of understanding of its basic principles and failure to use it correctly. The

(*Please turn to page* 90)

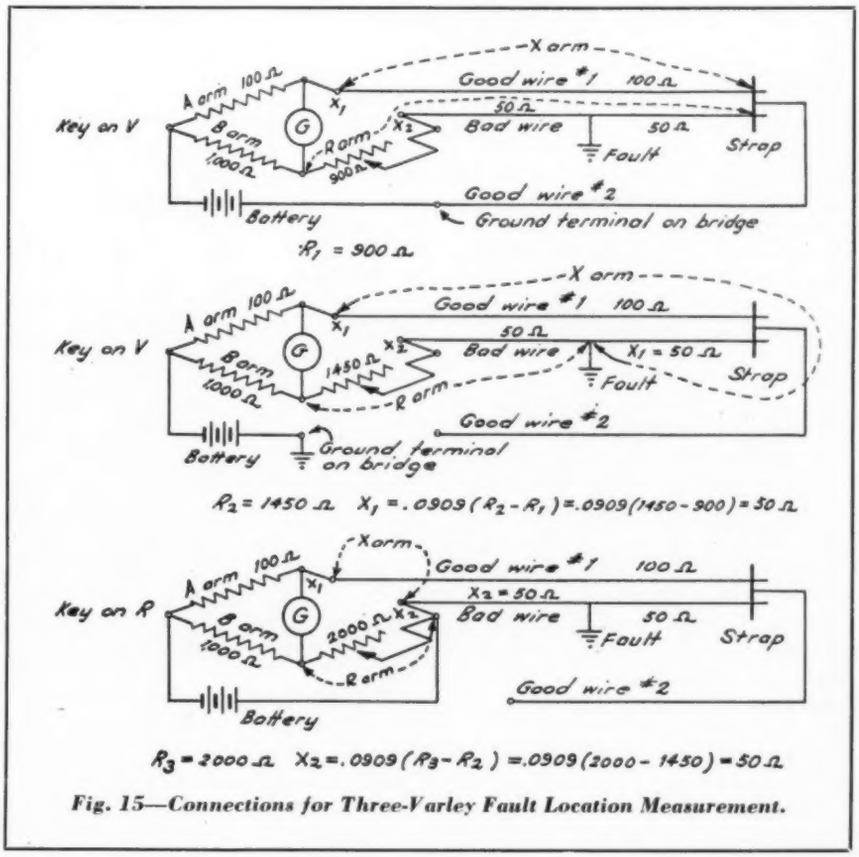


Fig. 15—Connections for Three-Varley Fault Location Measurement.

Snapped at Texas Convention were these two groups of prominent telephone personalities. (TOP PHOTO—left to right)—Ethel Cunningham, secretary, Pennsylvania Independent Telephone Association, Harrisburg, Pa.; Sam Shutt, Sherman; Jack Haley, Austin, and Mr. and Mrs. E. H. Danner, Sherman. (BOTTOM PHOTO—left to right) —R. H. Lumpkin, president of USITA, Mattoon, Ill.; J. I. Kennedy, Freeport, Ill., and Roy Smith, vice president Telephone Engineer Publications, Chicago.

★

42nd Annual TEXAS Convention

by

ROY F. SMITH

Vice President TELEPHONE ENGINEER Publishing Corp.

EXPRESSING a determination to whip problems of the industry in true Texas style, members of the Texas Telephone Association held their 42nd annual convention at the Plaza Hotel, San Antonio, March 11, 12, 13.

To this writer, who hails from Texas and has had the pleasure of attending many previous Texas conventions, the three-day meeting was a great success and much credit is due officers, directors, the convention committees, and executive secretary Jack Haley for a fine program that held the interest of the audience from start to finish.

The first general session was held on Tuesday afternoon with First Vice President Sam H. Shutt, general manager of the Texas Telephone Company, Sherman, presiding. Following the invocation delivered by Rabbi David Jacobson, Temple Beth El, San Antonio, C. J. Crampton, vice president of the San Antonio Chamber of Commerce welcomed the convention group to San Antonio.

"ON TO MONTERREY"

SPECIAL feature of the recent Texas convention was the post-convention trip to historic old Monterrey, Mexico. Traveling by special pullmans, approximately 50 telephone men and women made the trip and found it to be the "convention highlight" that Secretary Jack Haley had described.

The group left San Antonio on Thursday March 13 and spent Friday and Saturday visiting the historic spots in the Mexican city. They returned to San Antonio Sunday, March 16.

Commenting upon the achievements of the telephone industry, Mr. Crampton said, "Such achievements could not have been accomplished without the devoted, unending service of telephone workers in every category . . . All along the line telephony has inspired standards of public service. It is of such stuff that institutional reputations are made."

The response to Mr. Crampton's address of welcome was delivered by Ben Smith, division manager of the Southwestern Bell Telephone Company, San Antonio. Mr. Smith contributed much to the success of the Texas convention and many of the visitors enjoyed his hospitality.

In his response, Mr. Smith told Mr. Crampton, "You represent our customers, the business man, the business interest, the citizens of Texas. I speak for all the telephone people who collectively represent the 350 telephone companies serving 1,200,000 telephones in Texas."

Mr. Smith reviewed efforts of the telephone industry during the war years and since the war to provide service to thousands upon thousands more than they have ever been able to provide before. "While we added 150,000 telephones in 1946 in

Texas," he said, "unfortunately there are thousands still waiting for telephone service. But the telephone industry is proud of the job it has done to furnish good telephone service in so many places with so little to do so much for so many."

He stated that tomorrow requires imagination, enthusiasm, inspiration and hard work. "All of these things," he stated, "come before good telephone service is furnished the telephone user."

The report of Executive Secretary Haley reviewed the background of the Texas association.

Association's Code of Ethics

OSCAR BURTON, president of the Texas Association and general manager of the Gulf States Telephone Company, Tyler, reviewed in his annual address many of the industry's problems and recalled the Code of Ethics adopted by the Texas association at its 21st annual convention in 1926.

"It can be said," he stated, "that we get much compensation out of the 'spirit of service'. I express the hope, therefore, that government from on high (Washington, that is) will never completely destroy this 'spirit of service', although candor compels me to say that I am becoming concerned about it.

"Wages in this, as in other industries, have been increased tremendously, both voluntarily and through bargaining agreements, but the pressure continues in spite of the fact that in many cases the companies are operating on flat rates now 20 to 30 years old.

"Inability to pay wages out of proportion to gross receipts and the prevailing wage in other businesses and industries in the same community, we are told, is the fault of management. In other words, we are expected to charge all the traffic will bear for the service in the face of lawful regulations and an unwillingness on the part of the public to pay more for the service. We of management know full well that what might be considered prohibitive rates in any sized town will result in the withdrawal of patronage to the extent that nothing is gained by increasing rates."

Mr. Burton stated that collective bargaining has its good points.

"In many cases," he said, "where it has been sincerely approached, the employee group has been able to point out to management many changes that could be, and were, made in improving employer-employee relationships. What I am calling attention to is the unbalance, or lack of equity, under existing laws between the two groups which must be corrected if we are to have domestic peace, along with world peace; otherwise, we may as well turn this country back to the Indians. I confidently expect that labor racketeers will ultimately be put in their places; that professional politicians will be retired from office, and the rank and file of employees and the majority of the voters will restore peace and harmony."

In his concluding remarks, Mr. Burton read the Code of Ethics adopted by the Texas Association at its 21st Annual Convention held at Fort Worth, Texas, March 16-18, 1926. This Code reads as follows:

"Recognizing the importance, universality, and intimate association of our industry with the lives and business of our country, we who direct and administer the policies of our business, believing that we should encourage and foster high ethical standards and correct practices, do hereby adopt this code of ethics for our inspiration and guidance.

(1.) The telephone business in which we are engaged is an essential public service. As such it merits our best efforts toward efficiency and deserves consideration by its customers in keeping with its importance.

(2.) Service is our sole commodity. Our object is to supply it adequately without discrimination and to earn a reasonable return on the value of our facilities devoted to service of our customers.

(3.) Cooperation with our customers, our associates within the industry, and with the communities we serve is a fun-

Texas Association Reelects Officers and Directors

OSCAR BURTON, president of the Texas Association for the past 13 years, informed the convention that he wished to resign from his duties as active head of the association. The board of directors turned a deaf ear to his plea and drafted him again to be president.

The following officers were reelected:

President, Oscar Burton, general manager of the Gulf States Telephone Company, Tyler, Texas.

First Vice President, Sam H. Shutt, general manager of the Texas Telephone Company, Sherman.

Second Vice President, R. B. Fairly, president of the Southwestern Associated Telephone Company, Lubbock.

Secretary-Treasurer, Jean Shotwell, general manager of the Lufkin (Texas) Telephone Company.

Executive Secretary, J. B. Haley, Austin.

The following directors whose terms expired were reelected to office: W. L. Prehn, general manager, Southwestern Bell Telephone Company, Dallas; John Y. Rust, president of the San Angelo (Texas) Telephone Company; Jean Shotwell, general manager of the Lufkin (Texas) Telephone Company; Mr. Shutt, J. E. Stuart, vice president of the Two-States Telephone Company, Texarkana, Texas, and Fred C. Trower, general manager of the Three States Telephone Company, Corsicana, Texas. W. Gardner Winters of Houston, was elected to replace R. S. Martin who resigned.

Directors of Texas Association photographed at recent convention. SEATED—left to right—Jean Shotwell, Lufkin; R. B. Fairly, Lubbock; T. A. Singer, Dimmitt, and A. L. Robb, Electra. STANDING—left to right— W. G. Winters, Houston; W. L. Prehn, Dallas; Sam Shutt, Sherman; H. T. Shipman, Pecan Gap; J. E. Stuart, Texarkana; Oscar Burton, Tyler, and Fred Trower, Corsicana. Executive Secretary Jack Haley was absent at time this picture was taken.

Groups photographed between sessions of Texas Convention. (UPPER LEFT, left to right)—Morris Burton, Tyler, and R. M. Wopat, Sherman.

LOWER LEFT, seated, left to right—R. B. Fairly, Lubbock; Oscar Burton, Tyler; Roy Autry, Lubbock, and Mr. and Mrs. Leon Roberts, Chicago. Standing, left to right—H. S. Peterson, president Texas Creosoting Co., Orange; Howard Housley, Jim Rodgers, Minneapolis, S. R. Ryan, Washington (D.C.) manager of Gary Services & Investment Co.; E. H. Danner, Sherman, and Ken Gillette, supply sales manager, Automatic Electric Co.

UPPER RIGHT—Cook Electric's John Jaap (left) and Chet Ruth (right) discuss convention with C. W. Baldwin, Air Force Training Command, San Antonio.

LOWER RIGHT—(left to right)—Wm. C. Stack, general information department, St. Louis, Mo.; Roy Smith, TELEPHONE ENGINEER Publications, Chicago, and Earl Hancock, Stephenville.

damental prerequisite to good service, and we are pledged to such cooperation.

(4.) We seek to foster and maintain a reciprocal spirit of good will between the public whom we serve and our companies, and to that end we strive to be courteous, honest and fair.

(5.) We endorse truth for its own sake, and seek never to mislead with untrue statements whether publicly or privately made, this tenet being particularly applicable to truth in advertising.

(6.) We believe that our associates within the industry are men and women of honor who are seeking diligently to maintain and improve the high standards of our service.

(7.) The welfare of persons engaged in providing our service is of paramount importance, and consideration of their health as affected by working conditions, and providing adequate compensation are major duties of our members.

(8.) We are pledged to carry out the spirit and letter of all contracts in which we engage and to respect and observe those principles of our association to which our members subscribe.

(9.) The development of understanding among ourselves and the people of the communities which we serve is a manifest duty of our members to the end that our essential services shall result beneficially to all.

(10.) We dedicate our time and abilities in the conduct of our service to dealing with our customers and communities as we would be dealt with by them in the confident belief that in this way only, lies assurance of permanent success."

"Each and everyone of us," he said, "has pioneered certain territories for which we are responsible to our subscribers. My plea is that we may emphasize and re-emphasize this responsibility and resolve to do something about it. The prodding of Washington by the threat of government invasion of another field of private enterprise may prove to be a blessing in disguise. If we show the proper attitude and determination within reasonable limits to fulfill our obligation to these communities and, further, if we are able to convince the members of Congress who are concerned about the creation of a Rural Telephone Administration that there is nothing that we, or they, can do about it until men and material are available in variety and quantities sufficient to supply the demand, then we may escape government competition.

"I, therefore, lay upon you, and each of you, the imperative responsibility to immediately write our Senators and your own Congressman a letter outlining the difficulties under which you are working and what you expect to do about it under more favorable conditions. And, if you will use a nickel pencil tablet and lead pencil in writing them (and be sure to lick the pencil point as you set it down at the beginning of about every third word), it will be more impressive than were you to write them on embossed stationery. Even more impressive would be to lead your own subscribers into writing them, stating simply that they prefer to rely upon you to supply them with service than upon a bureaucracy established in Washington, D. C."

Management Problems

THE ADDRESS on "Management Problems" delivered by E. H. Danner, president of the Texas Telephone Company, Sherman, at the Tuesday afternoon session, outlined policies of business administration of value to every telephone company.

Commenting on the general impact of new technical developments, changes in economic philosophy and a general human unrest, probably as great as at any time in our history, Mr. Danner stated that the telephone business is a business "in which we build today and hope to reap tomorrow, and it is highly important that as we move forward we use every yardstick available to determine just what the future may hold."

He stated that the policies the industry follows and the work it does today will determine whether or not "we have a sound, going concern." "I believe," he said, "that if you will review the service records of the employees on your payroll, you will probably find that a very considerable percentage—probably a majority—of your employees have a service record of less than five years. In other words they have never worked in the telephone industry when it was a buyer's market and we were selling service.

"Those were the times when if a customer came in and signed a contract for a telephone one day, we tried our level best and generally succeeded in getting the telephone installed the next day."

He stated that present demand for service and the accompanying demand for improved service comes at a time when the cost of material and labor is generally the highest in the history of our nation.

"Since what we build today is the base on which we must earn in the future, it is necessary," he said, "that much care be exercised in establishing our policies and carrying out our programs. In the past we constructed our central offices and cable plants with a considerable margin

Slam The Door on pole upkeep!

It's What's Inside That Counts

When you choose Black Beauty poles to hold your lines, you'll find it is ***really*** a case of "Slamming The Door" on pole upkeep. The Texas "empty cell" creosoting method draws all moisture out of the wood and then fills each cell with high grade creosote, which keeps out termites, fungus, decay and other hazards that weaken and shorten the life of your poles. Each Black Beauty is tested for ample penetration before shipment, to guarantee long life.

Pole your lines with Black Beauties—completely armored against pests—and you can rest assured of added years of trouble-free service.

"BLACK BEAUTY" POLES
PRODUCT OF TEXAS CREOSOTING COMPANY

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AUTOMATIC ELECTRIC SALES CORPORATION
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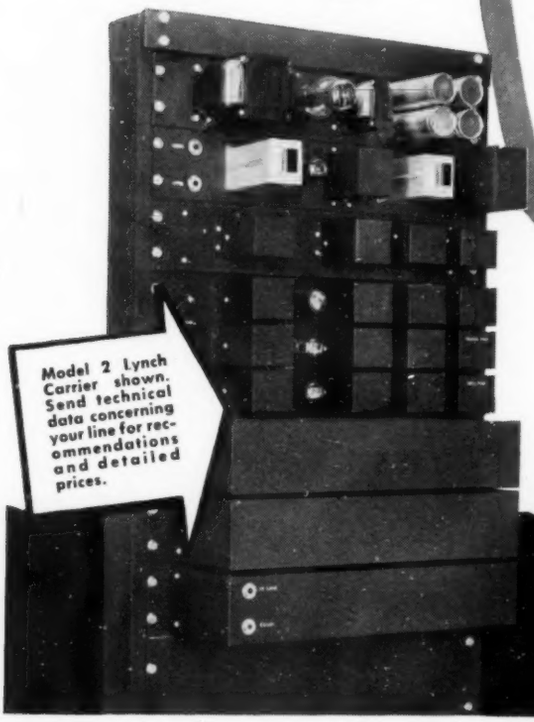
Wise buying?

(extreme example of possible saving)

250 miles new copper pair	= $50,000
Model 2 LYNCH Carrier Circuit	= 2,400
Saved by using LYNCH System	**= $47,600**

If your plans call for any telegraph or telephone line extension beyond 25 miles you'll save by using LYNCH Carrier Equipment every time!



Model 2 Lynch Carrier shown. Send technical data concerning your line for recommendations and detailed prices.

Operates on a standard dial or ring-down basis

The Lynch Carrier System is the newest and most advanced equipment of its kind. It is easily installed, economical to maintain, and fully automatic in operation. Uses only standard tubes which are available everywhere. Lynch Carriers can double, triple or quadruple the number of voice channels over any pair of copper wires. By adding Repeaters, lines 1000 miles long can be handled. Proven through extensive service with major railroads, independent telephone and oil companies. All Lynch Equipment arranged for standard rack mounting.

LYNCH *Carrier Systems*
3 EXTRA VOICE CHANNELS OVER ONE PAIR COPPER WIRES
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of spare facilities so that we would always be in the position of immediately meeting demands for service. As a base from which to estimate our future needs we used our past record of growth. Such a policy is still fundamentally sound if we use judgement in weighing the growth during the recent war years, the present demand and the development of the various classes of service.

"If we would take the annual increases in stations over the past five-year period as a base for projecting into the future for a 15-year period our anticipated requirements and maintain the same margin for growth as we have in the past, I am afraid that we would construct a plant and make an investment on which it would be difficult to earn a reasonable return in the future."

Mr. Danner recommended the use of other than the correct war years as a basis for estimating future requirements. "In the past," he stated, "we have not considered it good policy to place a cable which is sufficient in size to take care of only a five-year anticipated growth, but maybe this policy should be changed in the light of unusual high material and labor costs at the present time. Probably labor costs will not materially decrease but I believe it can be reasonably anticipated that some day in the not too distant future the demands for raw materials which are needed to construct our telephone plants will lessen and with it will come a buyer's market for the manufacturers and there may be some decrease in the cost of such material and equipment."

"Living Up To Our Reputations"

THE FINAL speaker at the Tuesday afternoon session was Leon F. Roberts, commercial and public relations representative of the Gary Group. Speaking on the subject "Easing The Strain On Public Relations By Living Up To Our Reputations", Mr. Roberts stated that "Unless you are a miracle man, or a magician, you probably are facing at this very moment demands for service which you cannot provide. Nor will you be able to meet these demands for some time to come. While some companies may not think they have cause for serious alarm, there is no gainsaying the fact that the crisis in equipment and material shortages has created a pressing public relations problem. It is highly commendable, therefore, that you make your position clear, not only to those whom you see personally, but to the entire community."

Mr. Roberts stated that the ways of making a company's position known include personal contact, telephone conversations, bill inserts, addressing local, civic and fraternal groups, radio

W. C. WHITE, wire chief, United Telephone Company, Llana, Texas, has a complete 21 year file of TELEPHONE ENGINEER and MANAGEMENT.

FOLLOW THEIR LEAD *for* GREATER TELEPHONE DIRECTORY ADVERTISING REVENUE

In city after city the soundness of Loomis sales methods is proved by consistently increasing revenues for Loomis clients.

Tested sales methods . . . plus our recognition of the public relations responsibility we assume as your representatives . . . build the sound good will that assures maximum sales, regular renewals, and a sound basis for future business.

Wesley H. Loomis, III, President, and Roland T. Beard, Vice-President, cordially invite your inquiry.

Loomis ADVERTISING COMPANY

502 Gettle Bldg., Ft. Wayne 2, Ind.
506 Olive St., St. Louis 1, Mo. 20 West 9th St. Bldg., Kansas City 6, Mo.
6908 Market St., Upper Darby (Phila.) Pa.; Omaha Nat'l Bank Bldg., Omaha 2, Neb.

announcements where radio stations are available, and the newspaper.

"All have their place," he said, "and for general all-around publicity purposes I know of no power greater than that of the press. For this reason—and this advice to many of you is redundant, I know—it pays to cultivate well the editor of your local newspaper and members of his staff. It pays to see that the newspaper folk have a thorough understanding of your problems, and it never does any harm to have them on your side."

Telephone Companies Have "Held the Line"

THE FIRST speaker at the Wednesday morning session was R. A. Lumpkin, Mattoon, Illinois, president of the United States Independent Telephone Association. Mr. Lumpkin outlined "Telephone Tasks For The Current Year" and presented an up-to-date resume of present conditions.

Mr. Lumpkin stated there is no question but what utilities have "held the line" against inflation better than any other single industrial group and that he believes the public generally realizes that fact. They are expecting that telephone rates will be adjusted in keeping with the increase that has occurred in telephone costs of living.

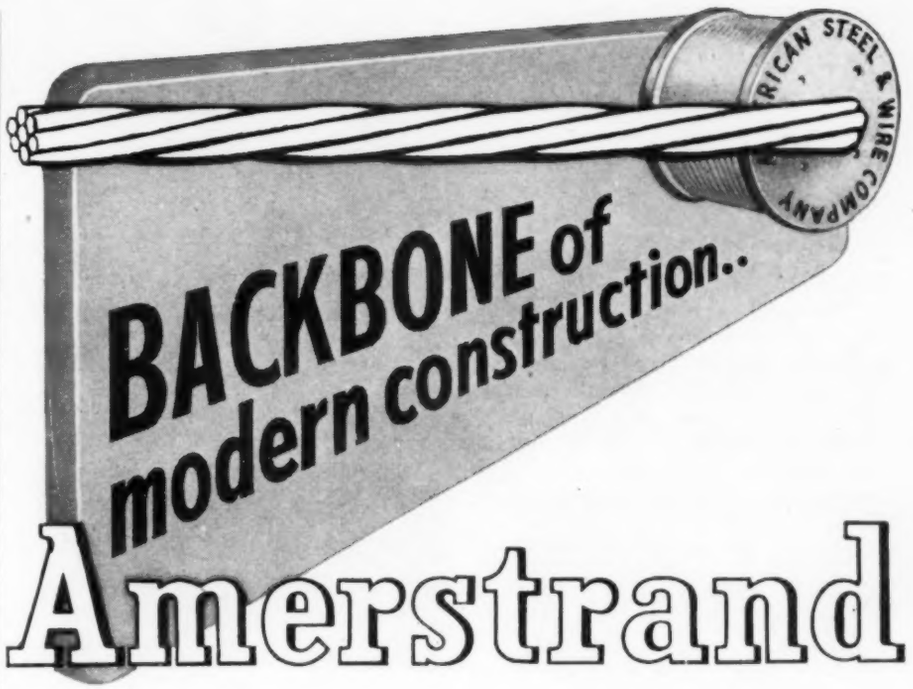
In South Carolina, the Southern Bell has recently stated that its expenses have increased 154% since 1940 while revenues have gone up only 108%. And during the same period total payroll costs increased 285%.

Preparatory to filling a request for increased rates in Illinois, the Bell Company in that state pointed out that revenues are up 59% over 1940 while expenses are up 80%. The net result is a 54% reduction in earnings, earnings as low as in the worst depression year. It is predicted that at the beginning of 1947, Illinois Bell earnings will be the lowest in the entire 65 year history of the company.

"Operating results such as these," he said, "will threaten the financial soundness of the telephone business. The consequence will be harmful to customers' service and employees' welfare. Hence it is evident that in the future telephone rates, in common with most other prices, must reflect the increased costs of doing business.

"Reasonable telephone company earnings mean *for the customers*—good telephone service—constantly improving. *For employees*—good jobs, good wages, good working conditions. *For Investors*—a reasonable and safe return on their money and *for all* the satisfaction that comes from the best telephone service in the world.

"That telephone service necessarily



All through your outside plant, guys and messengers have a big job to do. Through rain and wind, sleet and snow, their strands must carry your cables and keep your poles erect. From the central office to the most distant pole, they form the backbone of your plant.

No wonder telephone men everywhere choose Amerstrand for their messengers and guys. It's formulated specifically for these services, and its production is carefully supervised at every stage. That gives it the tensile strength and the superior corrosion resistance that is needed for telephone construction, to make the installation of messengers and guys a "one-time" job.

And Amerstrand is made in different weights and strengths, so you can order just the one you need for each job. That means better control of job costs—no hit-or-miss ordering of strand that's too light or too heavy.

Order Amerstrand for the finest of modern construction.

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includes more and better telephone service for rural establishments. . . . A lot of people in this country did seem rather shocked when it was revealed that in 1940 only 25% of the farms in this country had telephones. As a result there arose a great clamor among certain people for Federal intervention in the telephone field, intervention in the form of an RTA, patterned along the lines of the REA.

"A bill to establish such a program was introduced into Congress back in 1945 and a like bill has been introduced at each session of Congress thereafter. There was a time when many people thought that the RTA Bill was a desirable piece of legislation but a clear examination of the facts soon changed the minds of many of the most ardent proponents of the measure. The industry's accomplishment in the past five years has greatly reduced in number the remaining advocates of an RTA."

Recent figures given by Mr. Lumpkin reveal that in the short space of time from 1940 to 1945, the ratio of farms with telephones to all farms increased from 25% in 1940 to 32% in 1945. This came about as the result of the installation of over 339,000 additional farm telephones during the five year period. For the year 1946 the Bell System alone reported an increase of 330,000 farm telephones. In addition, the gain for the Independent segment of the telephone industry was well over 100,000 for the year.

"All of this," Mr. Lumpkin stated, "is an impressive picture of what is being done to extend to the farmers of America the best telephone service in the world. Despite the wide flung activities of the Federally sponsored REA, the number of farms with telephones already exceeds the number of those with electricity."

Following Mr. Lumpkin, Olin Culbertson of the Texas Railroad Comsion, Austin, presented an interesting discussion on the subject "Shall We Return To Fundamentals?"

The final speaker of the Wednesday morning session was George Hutson, of the information department of the Southwestern Bell Telephone Company. His address on "High Waves Of Communications" was well presented and covered an interesting subject.

The Wednesday afternoon session was devoted entirely to group conferences. The Auditing and Accounting Conference was conducted by Kirby W. Wilson, of the Three States Telephone Company, Corsicana, Texas; Commercial Practices Conference was under the chairmanship of A. G. Davidson, Southwestern States Telephone Company, Brownwood, Texas;

Special treat of Texas Convention was appearance of Major General Harry C. Ingles (left) who was introduced by President Burton.

Engineering and Plant Conference was guided by Chairman M. S. Burton, Gulf States Telephone Company, Tyler, and the Traffic Methods And Practices Conference was presided over by J. E. Robbins, San Angelo (Tex.) Telephone Company.

The general session on Thursday morning was devoted to reports of the Resolutions Committee, Memorial and Auditing Committees and the annual meeting of the Texas Chapter Independent Telephone Pioneers.

At the Pioneer meeting all directors with the expiring terms were reelected. Officers reelected were: J. E. Stuart, Texarkana, president; B. B. Griffith, Sherman, vice president, and Marvin Atkins, Bryan, secretary-treasurer.

As a special treat at the Thursday morning session, President Burton introduced Major General Harry C. Ingles who retired on March 31 after 37 years service in the army. General Ingalls was in Texas on a vacation and he said to the writer, "When I heard there was a meeting of telephone men nearby, I was just like a fire horse and had to get on the scene."

The General encouraged telephone men to continue working in unity and to be patient with manufacturers and their troubles would soon be ended.

Following the announcements and Mr. Haley's details of the Monterrey Trip the convention was adjourned with special praise for the convention committees who overlooked no angle that would contribute to the conventions success.—**THE END.**

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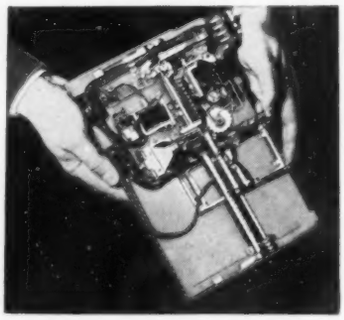
dial switching problems solved by

Stromberg-Carlson's New "XY" Switch



If new dial switching equipment is under consideration, your first step should be to investigate the amazing Stromberg-Carlson "XY" Switch.

This masterpiece of precision mechanism is smaller than other switches and, therefore, permits the use of more compact switching equipment than has been used previously. Universal, it can be used as a LINE FINDER, as a SELECTOR, and as a CONNECTOR, the "XY" Switch accomplishes a connection first by the "X" motion *across* the switch and second, the "Y" motion at right angles to it.

Ask your Stromberg-Carlson representative, or write us for complete details.

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habirshaw no. 17 bronze drop wire

NO. 17 BRONZE PARALLEL NEOPRENE SHEATHED DROP WIRE

NO. 17 BRONZE TWISTED PAIR NEOPRENE SHEATHED DROP WIRE

Stromberg-Carlson offers these two new Drop Wires with five important features:

1. High Dielectric Strength.
2. Flame-Resistant—Sheath will not conduct flame.
3. Weather-Resistant—No exterior braids to weather and festoon; impervious to effects of moisture, acids, oils, and factory fumes.
4. Mechanically Strong.
5. Time-Tested.

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sturgis standard no. 435-a

minimizes "chair fatigue"

Sturgis Chairs *take over* sitting strain! Maintaining best posture for operating with least muscular exertion, operators can recuperate quicker at rest periods from *actual* operational fatigues, minus—chair fatigue!

Height and depth *inter*-adjustments between Sturgis ample Saddle Seat (16½" wide, 14½" deep), and ample Plaited Backrest (8" high, 13" wide), are limitless and offer the equivalent of a *made-to-measure* chair to every operator.

Heavy welded steel tubing (1" O.D. for base, ¾" O.D. for footrest), makes Sturgis frames indestructible. Their hair-filled, genuine leather upholstery wears everlastingly.

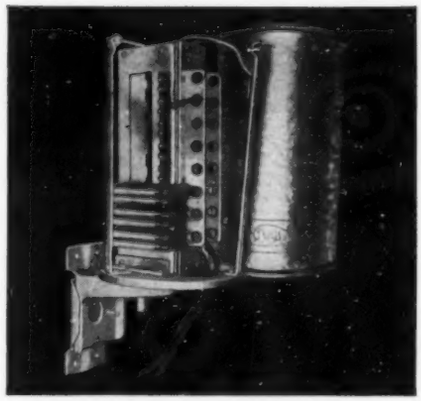
Chair Height Specifications

Seat Height Adjustment	Footrest Height from Floor	Seat Height Adjustment	Footrest Height from Floor
18" to 22"	5"	24" to 28"	10"
20" to 24"	6"	26" to 30"	12"
22" to 26"	8"	28" to 32"	13"

DISTRIBUTED EXCLUSIVELY BY STROMBERG-CARLSON

cook type S-20

pole cable terminal



Can be used as a protected or unprotected terminal. Made in 6, 11, 16, or 26 pair capacity.

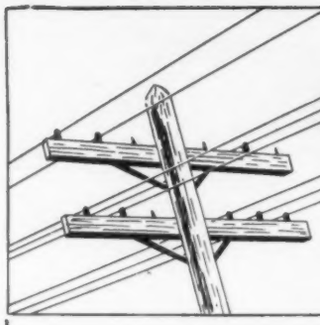
Cook Type S-20 Pole Cable Terminals are carefully engineered to offer the user:

MAXIMUM ECONOMY—because Cook Type H 20 Protector Units, containing fuses and primary and secondary lightning arresters, are added only as they are required.

MAXIMUM CONVENIENCE for installation and servicing. Drop wire connections are at front. Drops are led through individual insulating knockout holes. Self-soldering nozzle lies close to pole. Hood locks in raised position for working. Separate mounting bracket eliminates gaining of pole and provides easy installation.

MAXIMUM PERFORMANCE when used separately or as part of the Cook Trans-Mount System of Protection and Distribution. S-20 is of all steel construction, hot galvanized. Complete terminal designed for maximum insulation.

STROMBERG Telephone CARLSON



TELEPHONE ENGINEER Handbook Tables

Subject—POLE GUYING (Continued)

Index—Pole Line Design
Date—April 15, 1947

Table No. 10—Strength of Head Guys in Pounds Required for Poles at Railroad Crossings in Medium and Light Loading Districts.

Number of Wires	Ratio of Guy Lead to Height Not Less Than: 1.25	1	0.75	0.67	0.5
		For Medium Loading District			
2 to 6	4,000	4,000	4,000	4,000	4,000
8 to 10	4,000	4,000	6,000	6,000	6,000
12 to 20	6,000	10,000	10,000	10,000	12,000
22 to 30	10,000	10,000	12,000	16,000	16,000
32 to 40	12,000	16,000	16,000	16,000	20,000
42 to 50	16,000	16,000	20,000	20,000	26,000
52 to 60	20,000	20,000	26,000	26,000	30,000
62 to 70	20,000	20,000	26,000	30,000	36,000
72 to 80	26,000	26,000	30,000	32,000	40,000
		For Light Loading District			
2 to 10	4,000	4,000	4,000	4,000	4,000
12 to 20	4,000	6,000	6,000	6,000	10,000
22 to 30	6,000	10,000	10,000	10,000	12,000
32 to 40	10,000	10,000	10,000	12,000	16,000
42 to 50	10,000	10,000	16,000	16,000	20,000
52 to 60	12,000	16,000	16,000	16,000	20,000
62 to 70	16,000	16,000	20,000	20,000	26,000
72 to 80	16,000	20,000	20,000	26,000	30,000

• • • •

Subject—SOIL HOLDING STRENGTH OF ANCHORS

THE HOLDING strength of anchors is not entirely dependent on the physical strength of the anchor and rod. The kind and condition of the soil are very important factors in the ability of an anchor guy to hold a certain wire load. If a wrong type of anchor is selected or if it is of inadequate size for a particular soil class or condition, the anchor will slip, causing the guyed pole to lean. This is an important cause of excessive slack in line wires or cable spans. The following data, furnished by courtesy of the A. B. Chance Company, gives the maximum soil holding strengths of anchors manufactured by this company.

For determining the maximum soil holding strength of anchors listed in Tables Nos. 2 to 8, seven soil classifications are described in Table No. 1. These values are based on anchors set within 6 inches of the length of the rod. On account of the difficulty in accurately analyzing soil conditions, the given figures may vary within 15 per cent. The moisture content rather than the ingredients of the soil has a very important influence on the soil holding power. *(Tables presented through courtesy of A. B. Chance Co., Centralia, Mo.)*

TABLE NO. 1 — CLASSIFICATION OF SOIL FOR DETERMINING SOIL HOLDING POWER

Class 1. Hard Rock (Solid).

Class 2. Shale, Sandstone, (Solid or in adjacent layers).

Class 3. Hard, Dry, (Hardpan. Usually found under a Class 4 strata, resembling soft rock. Requires use of digging bar.)

Class 4. Crumbly, Damp, (Usually clay predominates. Insufficiently moist to pack into a ball when squeezing by hand. Particles crumble off).

Class 5. Firm, Moist, (Usually clay predominates. Other soils commonly present. When squeezed by hand will form into a firm ball. Moist soils in well drained areas will fall into this classification).

Class 6. Plastic, Wet, (Usually clay predominates as in Class 5. Due to unfavorable moisture conditions such as areas subjected seasonally to heavy rainfall, sufficient water is present to penetrate the soil to appreciable depth and though the area is fairly well drained, the soil during such seasons becomes plastic and when squeezed will readily assume any shape. This soil is not uncommon in fairly flat terrain).

Class 7. Loose, Dry, (Found in arid regions. Usually sand or gravel predominates. Filled in or built up areas in dry regions fall into this class. As the term implies, there is very little bond to hold the particles together).
Loose, Wet (Same as Loose, Dry, for holding power. High in sand, gravel, loam content. Holding power at some seasons good, but during rainy seasons absorbs excessive moisture readily with resultant loss of holding power. Predominant in poorly drained areas).
Most soils will vary in their classification during the year due to changes in their moisture content. Worst conditions should be estimated.

TABLE NO. 2—EXPANDING ANCHORS:

Catalog No.	Size	Area Sq. In.	Rod Dia.	Rod Length	MAXIMUM SOIL HOLDING STRENGTH—Pounds Class 3*	Class 4	Class 5	Class 6	Class 7
62	6″ 2-way	50	½″	7′	13000	11000	9000	7000	4000
64	6″ 4-way	70	½″	7′	16000	14000	11000	8500	5000
826	8″ 2-way	98	⅝″	7′	20000	17500	13500	10500	7000
846	8″ 4-way	115	⅝″	7′	22000	19000	15000	11500	7500
8410	8″ 4-way	130	¾″	7′	24000	20500	16000	12500	8500
841	8″ 4-way	130	1″	7′	24000	20500	16000	12500	8500
1044	10″ 4-way	200	1″	9′	31000	26500	21000	16500	12000
124	12″ 4-way	300	1″	10′	40000	34000	26500	21500	16000

*Expanding anchors are hard to install in this class soil.

• • • •

TABLE NO. 3—PLATE ANCHORS (Never-Creep)

Catalog No.	Size	Area Sq. In.	Rod Dia.	Rod Length	MAXIMUM SOIL HOLDING STRENGTH—Pounds Class 3	Class 4	Class 5	Class 6	Class 7
617	6″ x 17″	102	⅝″	7′	21500	18500	14500	11500	7500
622	6″ x 22″	132	¾″	8′	25000	21500	17500	13500	9500
822	8″ x 22″	176	¾″	8′	30000	26000	20500	16000	11500
827	8″ x 27″	216	¾″	9′	34000	29000	23500	18500	13500
835	8″ x 35″	280	1″	9′	41000	34500	27500	22000	16500
1040	10″ x 40″	400	1″	10′	50000	43000	34000	27500	21000

• • • •

TABLE NO. 4—SCREW ANCHORS (No-Wrench)

Catalog No	Helix Dia.	Area Sq. In.	Rod Dia.	Rod Length	MAXIMUM SOIL HOLDING STRENGTH—Pounds Class 4	Class 5	Class 6	Class 7
4345	4″	12½	¾″	4½′	6000	4500	3000	1500
6346	6″	28	¾″	5½′	8500	6500	5000	2500
816	8″	50	1″	5½′	11000	8000	6500	3500
10146	10″	78	1¼″	5½′	13000	10000	8000	4500
10148	10″	78	1¼″	8′	16000	12500	10000	6000

• • • •

TABLE NO. 5—SCREW ANCHORS (Wrench Type)

Catalog No.	Helix Dia.	Area Sq. In.	Rod Dia.	Rod Length	MAXIMUM SOIL HOLDING STRENGTH—Pounds Class 4	Class 5	Class 6	Class 7
1126-S	6	28	½″	5½′	8500	6500	5000	2500
1586-S	6	28	⅝″	5½′	8500	6500	5000	2500
1588-S	8	50	⅝″	5½′	11000	8000	6500	3500
1348-S	8	50	¾″	5½′	11000	8000	6500	3500
15810-S	10	78	⅝″	5½′	13000	10000	8000	4500
13410-S	10	78	¾″	5½′	13000	10000	8000	4500

• • • •

TABLE NO. 6—SWAMP SCREW ANCHORS

Catalog No.	Helix Dia.	Area Sq. In.	MAXIMUM SOIL HOLDING STRENGTH—Pounds Class 8	Notes
8125-A	8″	50	6000	These values are only typical figures for installations extending 8′ into the plastic clay underneath the layer of mushy silt or quicksand. Because of the wide variations found in testing in swamps, a test set-up is recommended where extensive guying in a swampy area is contemplated. High loads can be sustained where these anchors are screwed down deep.
10150-A	10″	78	9000	
122-A	12″	113	12000	
152-A	15″	176	15000	

• • • •

TABLE NO. 7—CONE ANCHOR (Pyramid)

Catalog No.	Cone Dia.	Area Sq. In.	Rod Dia.	Rod Length	MAXIMUM SOIL HOLDING STRENGTH—Pounds Class 2**	Class 3	Class 4	Class 5
6	6″	37	½″	6′		10000	8000	6000
8	8″	63	⅝″	7′		14000	11000	9000
10	10″	104	⅝″	7′	Rod	19000	15000	11500
12	12″	132	¾″	8′	Strength	21500	17500	14000
16	16″	239	¾″	9′		31000	25000	20000
19	19″	336	1″	10′		38500	31000	25000
23	23″	467	1″	10′		47500	38000	30500

*Anchor installations must be well tamped with 12″ of rock.
**In shale or stone, these anchors develop the strength of the rod.

• • • •

TABLE NO. 8—EXPANDING ROCK ANCHOR

Cat. No.	Rod Dia.	Rod Length	MAXIMUM SOIL HOLDING STRENGTH—Pounds	
R 315	¾″	15′	Class 1	Set in holes drilled 2″ in diameter and 12″ deep in hard rock, these anchors will develop the full strength of the anchor rod.
R 330	¾″	30′	Rod	
R 353	¾″	53′	Strength	

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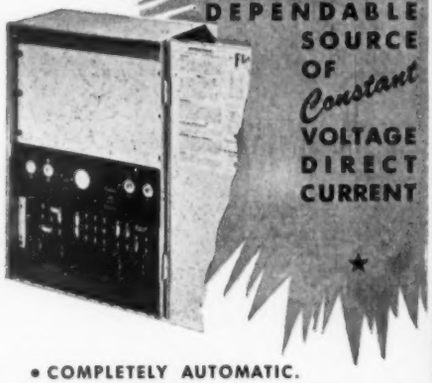

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Progress In Extending Bell Rural Telephone Service

(Continued from page 49)

And finally the installer arrives with the eagerly awaited telephone.

in appearance from that for most ordinary telephones in use today. The electronic apparatus is encased in a box slightly larger than an ordinary bell box. Utilizing house current, its receiving vacuum tubes are energized continuously so telephone calls can be received at all times. The apparatus at the central-office end of the power line is similar in design but necessarily a little more complicated. At this writing, seven power-line carrier installations are in service in six states. Five are operated by Bell telephone companies and two by independent telephone companies over the lines of four REA cooperatives and three private power companies.

ANOTHER new but similar method of voice transmission which is expected to become increasingly important in rural areas is telephone-line carrier. Toll circuits have for some time employed carrier systems to increase the number of long distance conversations which can be carried on pole lines. Today, carrier equipment similar to that developed for power lines is being used on rural telephone lines serving Norton Mills, Vermont, on the Canadian border, where an experimental project is being conducted by engineers of the New England Telephone and Telegraph Company and the Bell Laboratories.

Another method of bringing telephone service to more rural families is the joint use of long-span power-line poles by electric and telephone companies. "Joint use," as the industry calls it, is not new. Urban distribution plants have employed joint pole-line construction for years, but it was not extensively used in rural areas. New techniques and facilities have been developed since the war and have proved satisfactory in field tests. Power and telephone organizations are arranging for their widest possible application.

One of the most important features in the development of joint use is the high-strength steel wire previously mentioned, for it possesses sufficient strength to be used over the long spans commonly used on rural power lines.

Some potential telephone customers live out of reach of both existing electric power and telephone lines. This is particularly true in western United States, where there are vast stretches of ranch country. To reach these remote spots, Bell Laboratories engineers have been experimenting with radio telephony for rural telephones. Last August, engineers of the Mountain States Telephone and Telegraph Company and the Laboratories made trial installations of radio telephone equipment and other facilities at Cheyenne Wells, Colorado, which enable eight ranch fami-

lies to be connected with any other telephone in the Bell System network.

The eight families live in widely separated locations, 11 to 21 miles from the Cheyenne Wells telephone central office which serves them. Four of the ranches are connected to the central office by short-wave radio; the other four are reached by comparatively short open-wire lines from one of the nearby ranches having radio telephone equipment. Thus the telephones form an eight-party line.

Transmitting and receiving equipment and other apparatus are installed at the ranch houses and the telephone central office. Calls are made and received in substantially the same way as with any ordinary telephone. Service so far has been satisfactory; and on the basis of this experience, the development of a standard system is being undertaken.

PROVIDING TELEPHONE service to the waiting thousands of families in rural areas is at present, of course, the first order of business. So, although the Bell System program includes the reduction of the number of parties on rural lines to not more than eight, lines have been temporarily overloaded in order to give service to as many people as possible.

The program calls for not only the ultimate reduction in the number of telephones on a line, but also the replacement, whenever practicable, of the crank-type telephone by dial or other modern type of instrument.

Party-line ringing, too, is being improved. It is proposed to make arrangements so that the customer hears the rings of not more than half the parties on his line, and in many cases still further improvements can be made.

Activities to improve and modernize rural service are temporarily limited by the need to use available wire, cable, and central office equipment to extend service to new customers.

SERVICE-STATION LINES (also called farmer lines) are important in the rural picture. In 1946, more than 200,000 customers were served by such lines in Bell rural areas. Bell System "good neighbor" activities to advise and assist service station customers in improving the condition of their lines have been substantially expanded.

Paralleling Bell System's rural program is the Independent telephone industry's own accelerated program to extend telephone service in their rural exchange areas. Mr. R. A. Lumpkin, President of the U. S. Independent Telephone Association, has stated that figures of the Independent companies indicated a gain of about 100,000 rural telephones for the year just ended. In an earlier statement, he had estimated that the Independent telephone companies expected to spend more than $10,000,000 on rural plant construction during 1946.

Much has been accomplished in the past two years; much yet remains to be done. The pace of these activities will no doubt be accelerated. Rural construction projects exceeding those of 1946 are already fully engineered in anticipation of an increase in the supply of materials, and the Bell System's rural program moves steadily forward toward its goal of more and better telephone service for more people.—THE END.

USITA Issues Revised Data On Independent Industry

DATED MARCH 1, 1947, the United States Independent Telephone Association has issued a revised edition of its pamphlet, "The Independent Telephone Industry in the United States." Figures showing Independent stations, central offices, plant investment, gross revenues and number of employees, and similar data covering the Bell System, as of the end of 1946 are given. Certain editorial changes have been made in the narrative material. The pamphlet lists some 258 cities and towns having 2,000 or more telephones served by Independent companies together with certain other well-known places served by them. The pamphlet shows that at the end of 1945, 31 Independent companies reported gross revenues in excess of $1,000,000; 184 in excess of $100,000; and 49 between $50,000 and $100,000.

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All bids will be honored if received by 10:00 A. M. Monday, May 5, 1947. (The War Assets Administration reserves the right to reject any or all bids.)

Just write, or call at any WAA Regional Office and ask for a copy of Listing WAL-C9-60 dated April 21, 1947. This catalogue contains detailed information regarding condition, how to inspect the equipment, and forms which *must* be used for the submission of all bids.

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BOOK REVIEWS

by

Jay G. Mitchell

ANATOMY OF DEPRECIATION, Luther R. Nash, 225 pages, 5½" x 8", Public Utilities Reports, Inc. $5.00 Postpaid.

This is a timely work by an author who is an established authority of long standing in the economics of Public Utility management and operation. Based upon a refreshingly complete personal experience in this field the author has set out in simple and easily read language a discussion of his subject.

In brief the two general types of thought on this most important branch of cost accounting are clearly outlined. These two general concepts, straight line and reserve provision, both are discussed and compared. Specific cases are cited as the authority for stated opinion. The entire subject has heretofore become enshrouded in a mass of confusing literature which a straightforward and authoritative treatise will do much to dispel. This book is almost a "MUST" in the library of every engineer and accountant as well as that of the executive charged with the responsibility of building and preserving a sound revenue basis for his property. In a final chapter the merits and demerits of the two principal concepts of the subject are summarized. A complete index of subjects is provided together with a listing, alphabetically arranged, of cases cited in the several chapters of the book.

THE DECIBEL NOTATION, V. V. L. Rao, 195 pages, 5¼" x 8½", Chemical Publishing Company, Inc. $3.75 Postpaid.

The Decibel Notation as one method of rating transmission effectiveness is rather simple in principle but difficult in practical application. Its use should, of course, be coupled with thorough understanding of its origin and nature. In telephone engineering it was first applied about 1924 and this is the first specific treatise on the subject that has been made available to transmission technicians.

The author has developed his topic from the earliest developments of the logarithmetic unit. Reference levels are explained as well as decibel meters and decibel graphs. The book is divided into three parts, The Decibel, The Phon and Radio Engineering and Acoustics. Graphs and tables are plentifully interspersed with the other material and a complete subject index and bibliography is provided.

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Installing Business Telephones

(Continued from page 46)

possible in line with his wishes. A number of possible choices of location are described here.

If the desk is sufficiently close to the wall, the bell box or connecting block for the instrument may be mounted on the wall or baseboard. This is ordinarily the best location, especially when the subscriber is reluctant to allow the desk to be marred in any way.

If the space between the desk and the wall is too great to permit a satisfactory location of the bell box or connecting block, these items may be mounted on the desk, the inside wire or wiring cable being run directly to the desk. In this case there are several locations for the bell box or connecting blocks as follows:

(1) Within the knee well, (2) on the underside of the desk top, and (3) on the right or left side of the desk. Figure 10 illustrates.

A location for the bell box on the underside of a drawer pedestal or near the bottom of the desk is considered undesirable, on account of the greater chance of damage to the bell box. Also, the instrument cord should not be brought under the lower edge of the pedestal or a full-length apron covering the knee well. When it is necessary to place more than one bell box on the desk, it is a good idea to use a single backboard for mounting the bell boxes to avoid making too many holes.

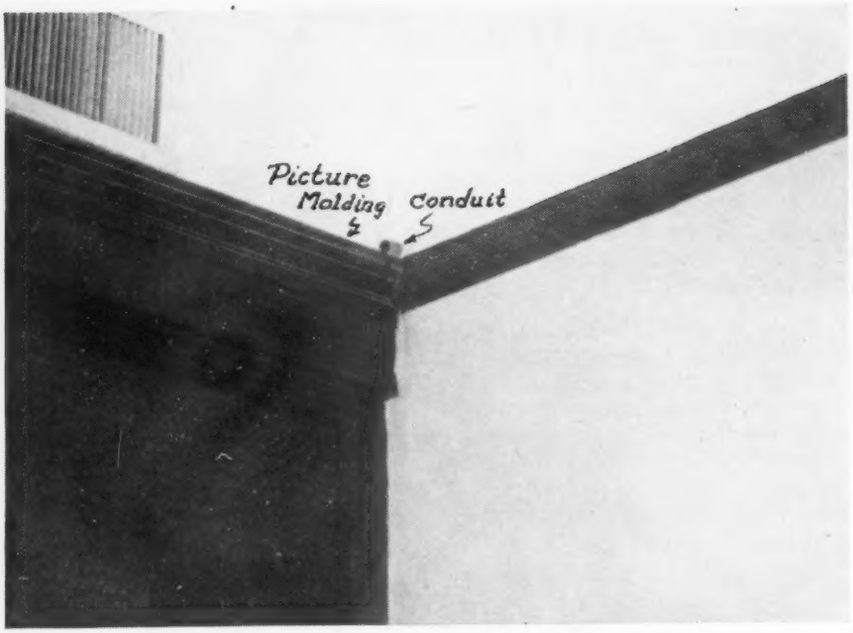
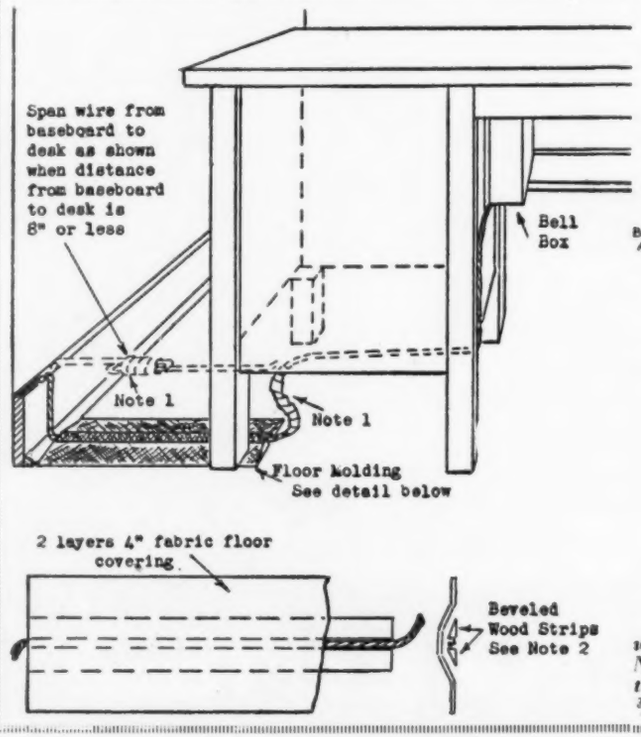


Fig. 7—Use of picture molding for station wire runs.

THE DESK-SIDE handset is intended for mounting on the side of an office desk, but it may be used in other locations where a set of this type would be more satisfactory.

As illustrated in Figure 12, the handset is provided with an adjustable bracket to enable one set to be adapted to any irregularity in the mounting surface; as for example, at overhanging edge of a desk top.

Suggested mounting positions for desk-side instruments are illustrated in Fig. 11. Care should be taken to properly locate the set to avoid having the handpiece strike the edge of the desk top when the handpiece is removed from or replaced on the


Span wire from baseboard to desk as shown when distance from baseboard to desk is 8" or less
Bell Box
Note 1
Note 1
Floor Molding See detail below
2 layers 4" fabric floor covering
Beveled Wood Strips See Note 2

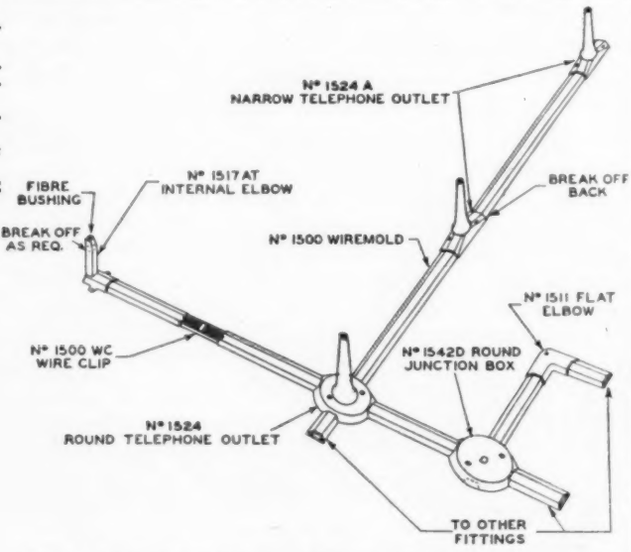

N° 1524 A NARROW TELEPHONE OUTLET
FIBRE BUSHING
N° 1517 AT INTERNAL ELBOW
BREAK OFF BACK
BREAK OFF AS REQ.
N° 1500 WIREMOLD
N° 1511 FLAT ELBOW
N° 1500 WC WIRE CLIP
N° 1542D ROUND JUNCTION BOX
N° 1524 ROUND TELEPHONE OUTLET
TO OTHER FITTINGS

Fig. 8 (right)—"Wiremold" over-floor duct system.

Fig. 9 (left)—Showing method of extending station wires to an office desk and installing wood floor molding. Notes: (1) Take up 8" to 10" of slack in wire and tape together with friction tape as shown. (2) Two pieces ¼" x ¾" for 2 wires (or ½" x 1½" for 4 wires).

cradle hook. If the set is equipped with a dial, the handset should be located so that the subscriber can easily reach the dial. The dial mounting can be easily adjusted to any desired position.

Conclusion

THIS ARTICLE has described the more common methods of installing telephone instruments in offices. Business installations, on the whole, are more complicated than residence installations, and often require ingenuity on the part of the installer to meet unusual situations. Up-to-date wiring plans, supplemented by specific instructions from the commercial department, are needed in addition to standard instructions to enable the installer to locate the telephone instruments and any required auxiliary apparatus in the proper places and use the proper kind of station wiring. It is important that the subscriber be consulted in all cases to ascertain his wishes. If it is not possible to follow his desires on account of conflict with his instructions, or possibility of hazard to the telephone user or the station equipment, the installer should explain this fact to him and try to get him to agree to change his personal instructions. Usually it is possible to effect a compromise that is satisfactory to the subscriber. Difficulties in this regard can be minimized, if the commercial department has previously discussed the nearest practicable arrangement of the substation equipment with the subscriber and then transmits this information to the service department for the use of the installer.—THE END .

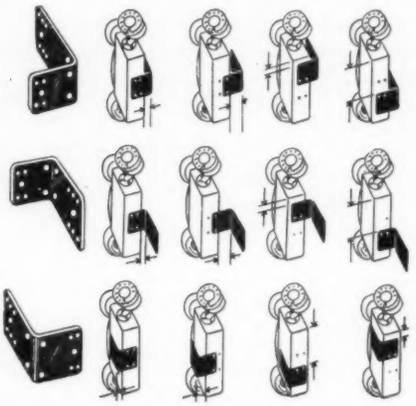


Fig. 12—How different positions of dial are made available on the desk-side handset. (Courtesy of Kellogg Switchboard & Supply Company.)

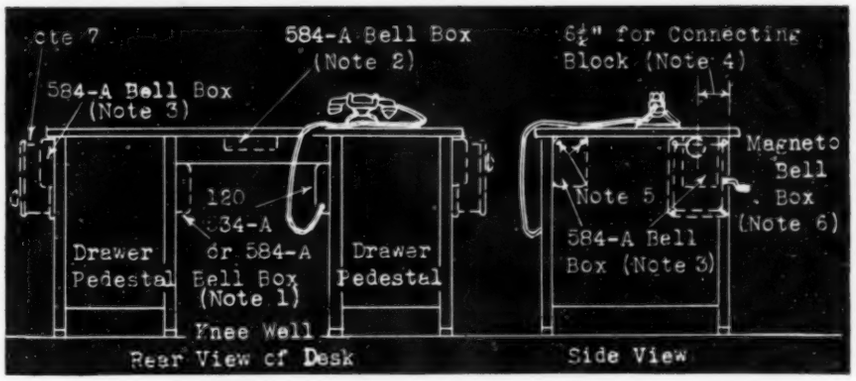

584-A Bell Box (Note 2)
584-A Bell Box (Note 3)
6½" for Connecting Block (Note 4)
Magneto Bell Box (Note 6)
Note 5
584-A Bell Box (Note 3)
120 534-A or 584-A Bell Box (Note 1)
Drawer Pedestal
Drawer Pedestal
Knee Well
Rear View of Desk
Side View

Fig. 10—Showing suggested locations of bell box or connecting block for desk set on office desk. Notes: (1) Preferred location for automatic or common battery bell box for two-piece desk set or connecting block for self-contained desk handset. Dotted lines show alternative mounting arrangements. (2) Location for compact bell box when room is available underneath desk top.

(3) Install common battery or dial bell box on desk side only when location inside knee well is impracticable. Use compact bell box, if practicable. (4) Location for connecting block when knee well location cannot be used. (5) Use two mounting screws in location where screws will enter corner cleat back of panel, especially when panel is too thin to properly hold the screws alone.

(6) Mount magneto bell box at right or left side only. Use four mounting screws, three in trim at edges of desk and one in panel; provided panel is not too thin to hold the screw. Use backboard if arrangement of trim interferes with satisfactory mounting of bell box. (7) Mount magneto bell box upside down at right side to make generator handle accessible to user.

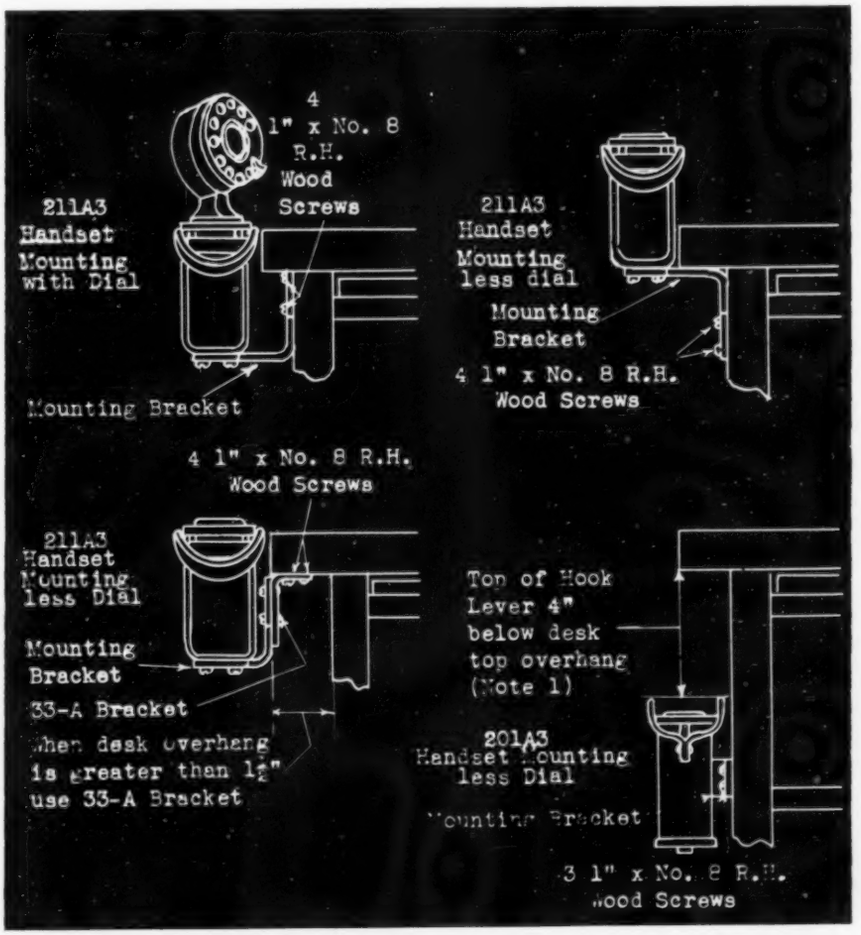

4 1" x No. 8 R.H. Wood Screws
211A3 Handset Mounting with Dial
Mounting Bracket
211A3 Handset Mounting less dial
Mounting Bracket
4 1" x No. 8 R.H. Wood Screws
4 1" x No. 8 R.H. Wood Screws
211A3 Handset Mounting less Dial
Mounting Bracket
33-A Bracket
When desk overhang is greater than 1½" use 33-A Bracket
Top of Hook Lever 4" below desk top overhang (Note 1)
201A3 Handset Mounting less Dial
Mounting Bracket
3 1" x No. 8 R.H. Wood Screws

Fig. 11—Showing suggested locations and methods of mounting desk-side handset on office desk. Note: Use this arrangement only for handsets without dial. Handpiece must clear desk overhang when being removed from hook.

Roundtable LINE and DESK Discussions

Edited By
J. S. REED, JR.

Q. What do you recommend for protecting an open cable splice in wet weather?

A. The method of protecting an open cable splice in wet weather would depend on where the splice is being made. If you are working on a splice in an underground cable, it is advisable to hang a sheet of rubberized cloth, slicker cloth, or other similar waterproof material on the manhole wall back of the splice to keep the paper insulation on the exposed cable pairs from absorbing moisture from the damp wall; also spread another waterproof sheet above the splice to turn aside water drippings from the manhole entrance or roof. If you are working on an aerial cable splice, you will, of course, have a tent to cover the splice. There is a tendency, however, for rain water to creep along the sheath exterior to the splice. This creeping moisture can be stopped by wrapping the sheath with friction tape just inside the tent. The tape barrier should be built up high enough to cause water to drip off it, instead of creeping past it.

◆

Q. When building a wire lead, how should the poles be distributed as to strength at important points in the lead?

A. When building a pole lead, the heavier poles (especially those with the largest butts) should be selected for placing at corners, dead-ends, and junctions in the wire loads. At these points an unbalanced pull of the line wires occurs, which places a heavier stress on the poles there than at other locations in the lead, and it is, therefore, desirable to have the strongest poles at these points. In the case of very heavy leads, it may be desirable to use one class larger poles at the points of unbalanced pull, particularly dead-ends and corner poles, where a large pull occurs.

Free Help on Problems

IF YOU DON'T see a ready answer to your questions, let TELEPHONE ENGINEER'S staff of technical men tackle it for you. This is a free service. Your question and the resulting answer may not only solve your problem but help the many other telephone men reading these columns. Jot your questions on a postcard and look to LINE and DESK for reply.

Q. When we place a corner pole, how should one or two anchors be placed to properly hold the line?

A. Figure 1 shows how one or two anchors, as required, would be placed at a corner pole, so as to hold the line from either direction. When using two anchors, each anchor is placed in the direction of the line it is to hold. If only a single anchor is to be installed, this anchor must be located so as to bisect the line angle; otherwise the pole will be badly distorted. To save time and trouble, a Dillon bisector is recommended for locating the anchor.

◆

Q. When should cable be used in place of drop wire for runs into apartment houses?

A. In general, if it is found that more than five drop wires or six bridle wires will ultimately be placed in a single run into an apartment building, the installation of block cable will prove to be more economical in the long run.

◆

Q. Should we use double arms on poles at a 2-pole corner?

A. The standard practice has been to use a single crossarm on each pole at a 2-pole corner in an open-wire lead. The crossarms bisect the angle at each pole. Experience, however, has shown that the single crossarm construction is not always adequate to support the wire load without twisting, especially when long spans of wire are involved. The use of double arms on the corner poles will obviate this difficulty.

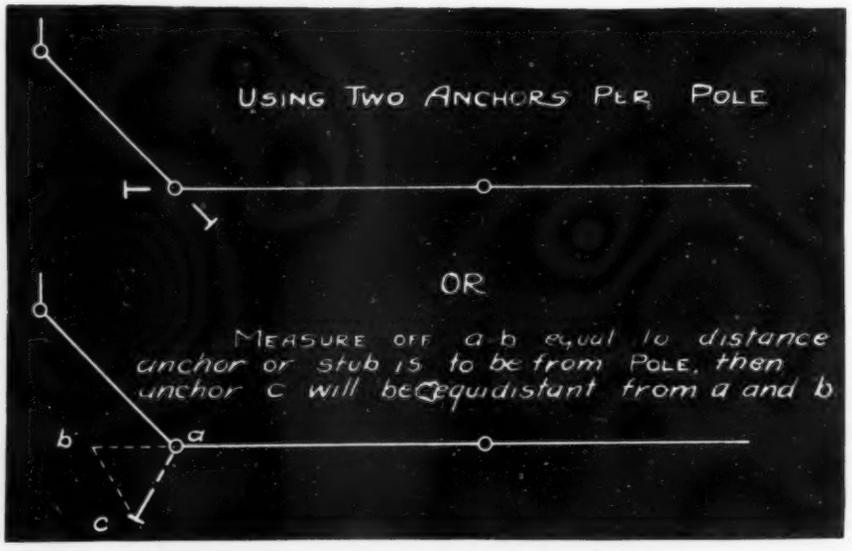

USING TWO ANCHORS PER POLE
OR
MEASURE OFF a-b equal to distance anchor or stub is to be from POLE, then anchor c will be equidistant from a and b
a
b
c

Fig. 1—Proper methods of locating anchors at a corner pole.

Coming Conventions

Ohio Independent Telephone Association, Deshler-Wallick Hotel, Columbus, April 22 and 23.

Indiana Telephone Association, Claypool Hotel, Indianapolis, May 7 and 8.

Kansas Telephone Association, Jayhawk Hotel, Topeka, May 16 and 17.

New York State Telephone Association, Hotel Onondaga, Syracuse, May 21 and 22.

Wisconsin State Telephone Association, Park Hotel, Madison, May 21 and 22.

Michigan Independent Telephone Association, Olds Hotel, Lansing, September 17 and 18.

United States Independent Telephone Association, Stevens Hotel, Chicago, October 14, 15 and 16.

North Carolina Independent Telephone Association, Hotel Southern Pines, Pine Needles, October 27 and 28.

Virginia Independent Telephone Association, Hotel Roanoke, Roanoke, October 30 and 31.

Missouri Telephone Association, Governor Hotel, Jefferson City, November 17 and 18.

WAA Offers Surplus Telephone Equipment

Surplus telephone equipment, which cost the government more than $1,500,000, is on sale at fixed places from March 31 to April 21 in Chicago and Decatur, Ill., War Assets Administration officials have announced.

The material to be sold consists of wire and cable, cords, head and chest sets, repeaters, switchboards, telephones, test equipment, tool equipment, and other related items in both used and unusued condition. Detailed information about the items is contained in listing WAL-C9-59, which will be available prior to the sale at WAA regional offices.

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The Dillon is universally used in telephone work. Accuracy, and long-lived dependability are the answers. Indicates exact tension in guy strand, messenger and wire.

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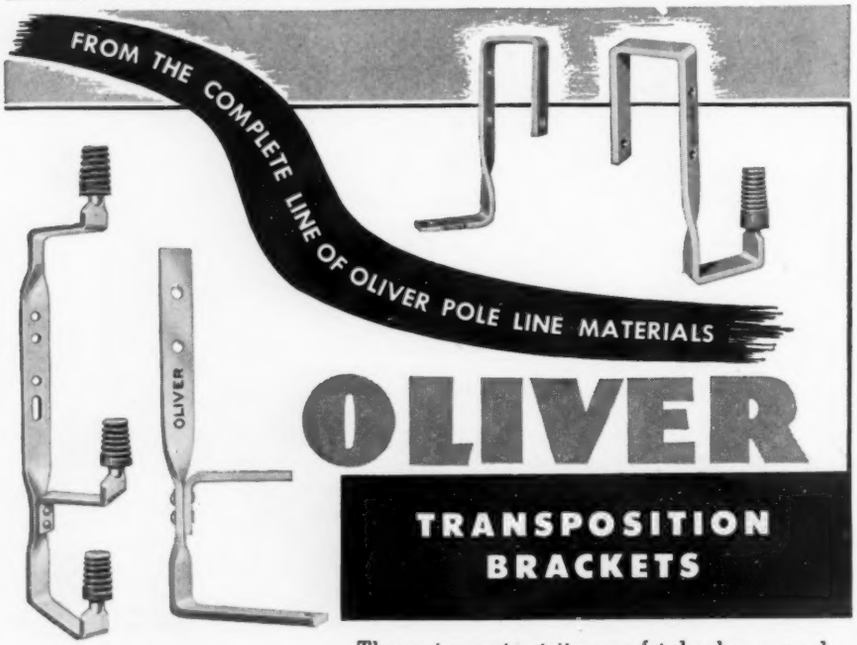

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TRANSPOSITION BRACKETS

These important items of telephone and telegraph line hardware are representative designs, based upon practical experience extending over many years. Complete sizes and details of these and other designs are given in Oliver Catalog 43.

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SOUTH TENTH & MURIEL STREETS
Pittsburgh 3, Pennsylvania

MAKERS OF POLE LINE MATERIALS SINCE 1894

Colorado Engineering Firm Offers Special Services

The Engineering Service Associates of Nunn, Colorado, have announced a new engineering consulting service for Independent telephone companies in the Rocky Mountain area including advisory and installation service on mobile and urban radio telephony and power line carrier service.

R. R. Mann heads up the organization ably assisted by E. C. Radin. Mr. Mann has had considerable experience as an Independent operating telephone man as well as having many years of practical engineering experience. His organization will handle plant, and traffic engineering, and appraisals in addition to services outlined above. At the present time Mr. Mann has under construction a frequency modulation carrier current system for use by small Independent telephone companies with expectation that equipment of this type will find extensive use by large and small companies operating in sparsely settled regions.

Another office is to be opened in Alberquerque, N. Mex. as soon as suitable quarters are located. The Engineering Service Associates is associated with North American Engineers of Akron, Ohio.

◆

J. L. McCaffrey Named Illinois Bell Director

John L. McCaffrey and William V. Kahler were elected directors of the Illinois Bell Telephone Company at a recent annual stockholders' meeting. They fill vacancies caused by the death of Sydney G. McAllister and the retirement of William O. Kurtz. McCaffrey is president of the International Harvester Company and Kahler is vice president of Illinois Bell.

The stockholders also voted to amend the company's articles of incorporation permitting it to issue up to 2,500,000 share of capital stock at a par value of $100 each. Until now the company has been authorized to issue 2,000,000 shares.

G. K. McCorkle, president, reviewed the company's activities in 1946 and reiterated the company's urgent need for higher telephone rates "to restore a reasonable balance between income and expenses."

"Because the record volume of business in 1946 was accompanied by expenses which rose more rapidly than revenues," he stated, "the company's actual earnings were substantially below the lowest depression year."

U·S·S AMERTEL 135
saves up to 30% of construction costs

With 2½ times the tensile strength of "BB" wire, U·S·S Amertel 135 can be used in spans up to 350 feet in length for heavy loading districts. In light loading districts, spans up to 500 feet have proved practical.

Some telephone companies have estimated that their savings have amounted to 30% over previous construction where spans of 150 to 180 feet were used. Savings in poles may run as high as 20 to the mile.

The greater strength of Amertel 135 also results in less wire sag so that short poles can often be used.

In addition to low construction costs, Amertel 135 offers *low electrical resistance*—about 20% less than standard "BB" wire. *Long service life* is also assured by the hot dip process of galvanizing.

Write for our booklet on Amertel 135 for complete engineering information.

American Steel & Wire Company
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Columbia Steel Company, San Francisco,
Pacific Coast Distributors
Tennessee Coal, Iron & Railroad Company,
Birmingham, *Southern Distributors*
United States Steel Export Company, New York
UNITED STATES STEEL

Spans: 300 feet (Heavy Loading)
500 feet (Light Loading)
WITH U·S·S AMERTEL 135 NO. 12 B.W.G.

Tops in Operating Efficiency!

That's right! The operating efficiency of YORK-HOOVER BODIES is tops because convenience, accessibility and long life are built into each unit, from the largest to the smallest.

For over fifty-five years, ever growing experience plus top quality materials and fine craftsmanship have been the basic factors contributing to the reliable performance of York-Hoover Bodies . . . factors, too, that have earned and maintained the valued confidence of our customers.

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BODY DIVISION
CORPORATION
YORK, PENNSYLVANIA

CHANCE CABLE CARS
Make the Job Safer and Easier

The No. 27 Chance Cable Car is built to meet the most exacting specifications for safety and performance. The hand brake stops the car and holds it anywhere on the messenger. Lightweight Aluminum rubber cored wheels ride smoothly over hundreds of thousands of rings without appreciable wear. Sturdily constructed steel frame and reinforced seat will last a lifetime—seat is easily detached and adjustable in height for comfort and convenience.

Chance Cable Cars were used by the Armed Forces. They are built to give you the same exceptional service. For more information, write today.

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SINCE 1889
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CLAY CONDUIT

The proved and standard Protection for Underground Telephone Cables.
Cheapest in the long run. Highest quality and a full line of shapes.

National Fireproofing Corp.
202 E. Ohio Street, N. S.
PITTSBURGH, PA.

Modern TESTING Instruments

(Continued from page 69)

use of "good wires" which do have some leakage is sufficient in many cases to give readings which are in error. It can be seen that if the current can enter the good wire at some point along its length, other than at the bridge or at the strap, the reading will be in error.

Another source of error is failure or carelessness in converting fault to strap resistance computations into feet of cable. Such conversions must take into account the fact that several different gauges of cable may be involved in the section of bad wire between the strap and the fault. If this is the case the resistance of each section of each gauge must be computed using feet-per-ohm values, then from a comparison of the sectional values with the measured fault to strap resistance the point at which the fault lies can readily be determined. This point is illustrated by the example given in Fig. 17 (page 92).

Other factors which control the accuracy of a bridge location are: (1) the effect of the office wiring resistance on measurements, (2) the effect of pair sag and twist on cable circuit length, (3) the effect of temperature on resistance, (4) the effect of the difference between the temperature of an aerial and an underground section of the same cable. The relative importance of these several factors depends on the distance from fault to strap. In general, when the fault is a considerable distance from the strap the several factors listed above are of greater importance. As a rough rule, fault to strap resistances of 20 ohms or less in the usual sizes of aerial exchange cable, can be converted by tabular feet-per-ohm values without serious error. The most accurate results will be obtained on aerial cable when the resistance of the bad wire is measured (see Fig. 16) and converted to feet-per-ohm in terms of the known length of the cable.

Gauge	Feet Per Ohm Per Wire	Ohms Per 1000 Wire Feet	Ohms Per Loop Mile
28	15.08	66.29	700
26	24.00	41.67	440
24	38.54	29.95	274
22	61.75	16.19	171
19	124.23	8.05	85
16	251.43	3.98	42

Table No. 1—Cable Resistance Conversion Values.

The *transmission* attenuation values for exchange or toll circuits can be measured either by comparison (substitution) type measuring sets or by means of a direct reading alternating current voltmeter (usually known as a *power level meter*). For extremely accurate work, as for example, on the principal toll lines, the more expensive and involved transmission measuring sets are generally used. But for ordinary exchange and minor toll lines the simple copper-oxide power level

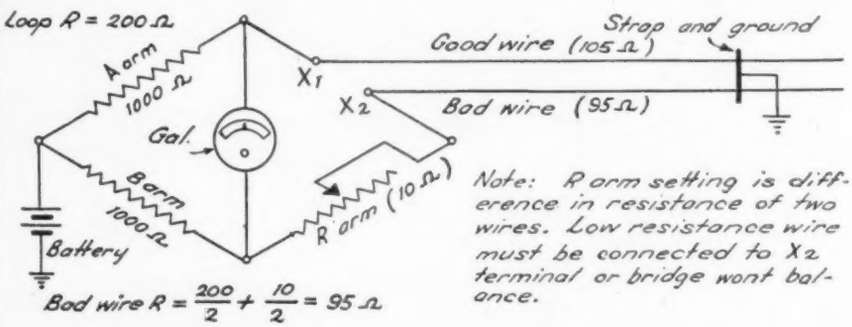
Loop R = 200 Ω
A arm 1000 Ω
X1
X2
Strap and ground
Good wire (105 Ω)
Bad wire (95 Ω)
Gal.
B arm 1000 Ω
R arm (10 Ω)
Battery
Note: R arm setting is difference in resistance of two wires. Low resistance wire must be connected to X2 terminal or bridge wont balance.
Bad wire R = 200/2 + 10/2 = 95 Ω

Fig. 16—Use of Simple Varley Method to Measure Bad Wire Resistance.

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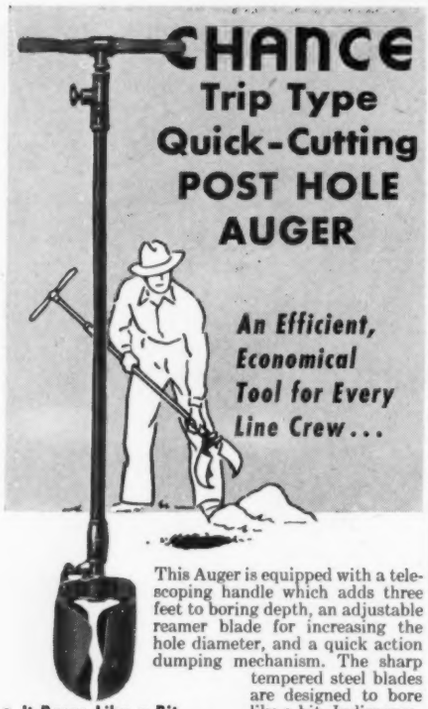

This Auger is equipped with a telescoping handle which adds three feet to boring depth, an adjustable reamer blade for increasing the hole diameter, and a quick action dumping mechanism. The sharp tempered steel blades are designed to bore like a bit. Indispensable for anchor installations and post holes.

- It Bores Like a Bit...
- Adjustable Length...
- Adjustable Hole Size...
- Easy Dump Trip...

C-468

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DROP WIRE

TWISTED PAIR and PARALLEL in NEOPRENE

Manufactured to exacting specifications, utilizing advanced techniques and modern equipment under positive laboratory control.

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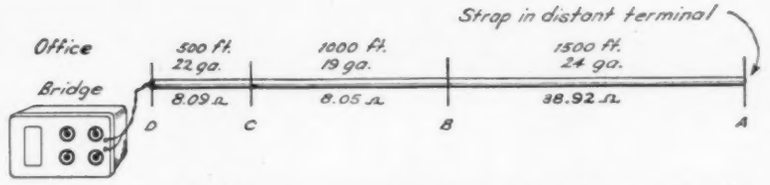


Step #1 – Bridge measurement shows a resistance strap to fault of 50 ohms hence fault must lie in 22 ga. section.

#2 – Fault must be 3.03 ohms from C, ie., 50 – 46.97 Ω

#3 Distance to fault from C equals 3.03 Ω × 61.75 ft. = 187.10 ft.

Fig. 17—Example of Fault Computation Involving Several Different Gauges.

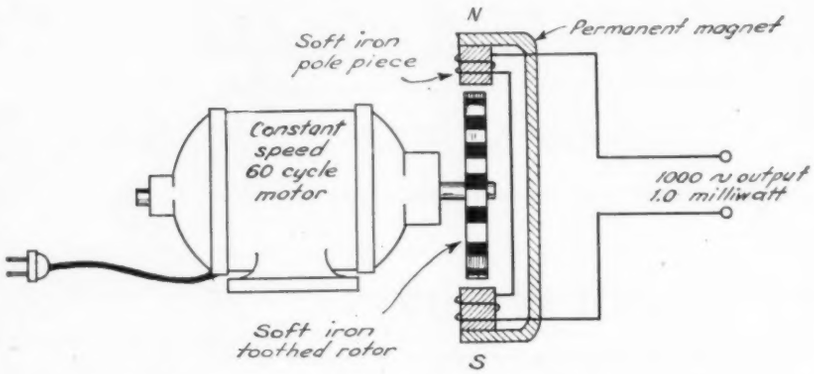


Fig. 18—Schematic of Tone Wheel Type 1000 Cycle Generator Used for Transmission Measurements.

meter can be used in conjunction with a 1000 cycle oscillator (see Fig. 18). Most Independent company transmission measuring requirements can adequately be handled with this latter type of instrument.

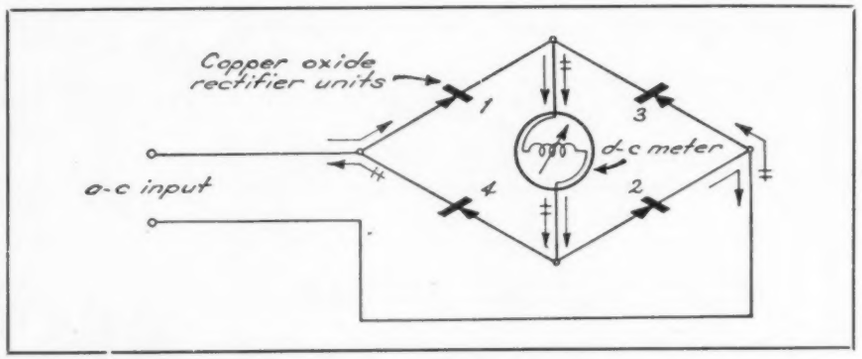


Fig. 19—Schematic of Copper Oxide A-C Voltmeter Circuit.

The copper-oxide a-c power level meter consists of a copper-oxide rectifier used in conjunction with a sensitive d-c microammeter. Alternating current applied to the terminals of the instrument is converted into direct current by the rectifier elements (see Fig. 19) and the rectified current is applied to a sensitive microammeter thus giving indirectly a quantitative indication of the a-c voltage present on the input terminals of the instrument. This arrangement gives the sensitivity inherent to a direct current type of instrument plus the ability to handle alternating current in the voice frequency range. Ordinary a-c voltmeters of the soft iron vane type are not sensitive and cannot be used at frequencies above 100 cycles.

(To be continued in your May Issue of TELEPHONE ENGINEER and MANAGEMENT.)

Modern Truck Equipment

(Continued from page 60)

and parts service facilities, as well as quality and promptness of service.

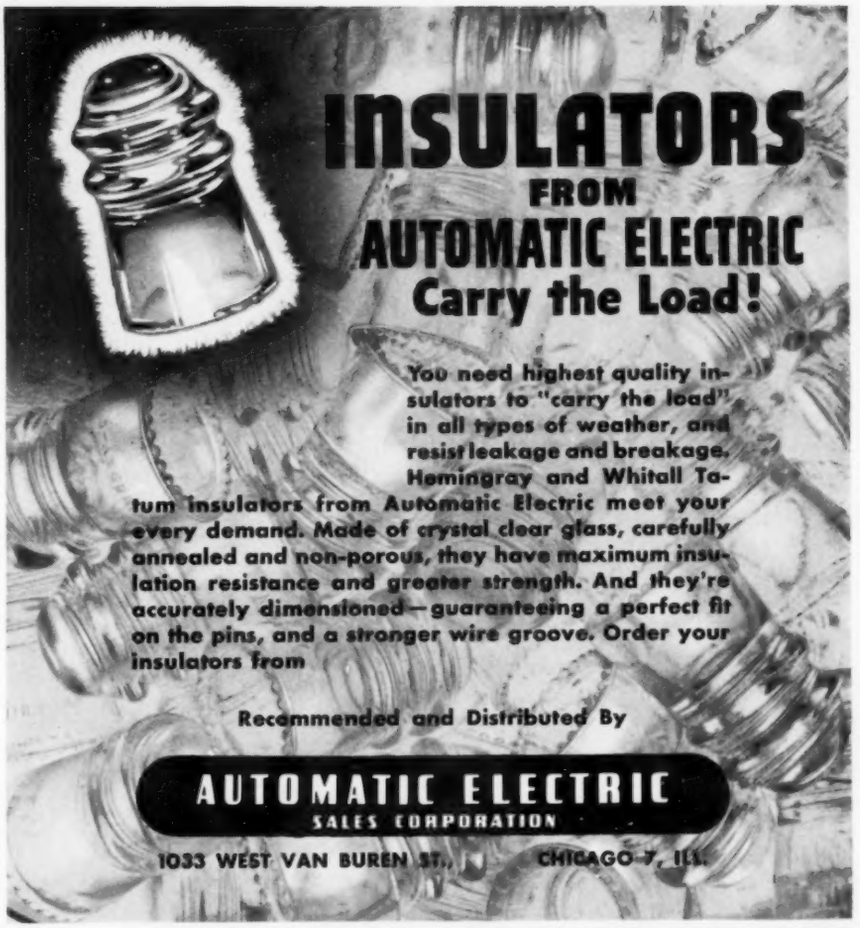
(3) Comparative Economy.
Consider cost of repairs, depreciation, gasoline, interest on investment, lubricants and license fees.

(4) Conformity with Legal Requirements.
This last consideration focuses attention on such items as gross weight, axle loads, tire sizes, overall dimensions, speed, brakes and lights.

AN OUTSTANDING feature of recent truck design is the five or six-man cab on line construction and maintenance trucks. Known as the "Cab Forward" model or the "Cab Over Engine", the large cab can be used on either the conventional or the cab-over engine design of chassis. Some companies prefer the cab-over-engine chassis because its use obviates lengthening the wheel base by about three feet to take a given body. The shortening of the chassis by putting the cab over the engine nearly eliminates the lengthening due to adding an extra seat in the cab.

The five-man cab has proved in on work where it is necessary to

Marmon-Herrington Ford conversion with earth boring equipment mounted. All-Wheel Drive over difficult terrain makes faster progress.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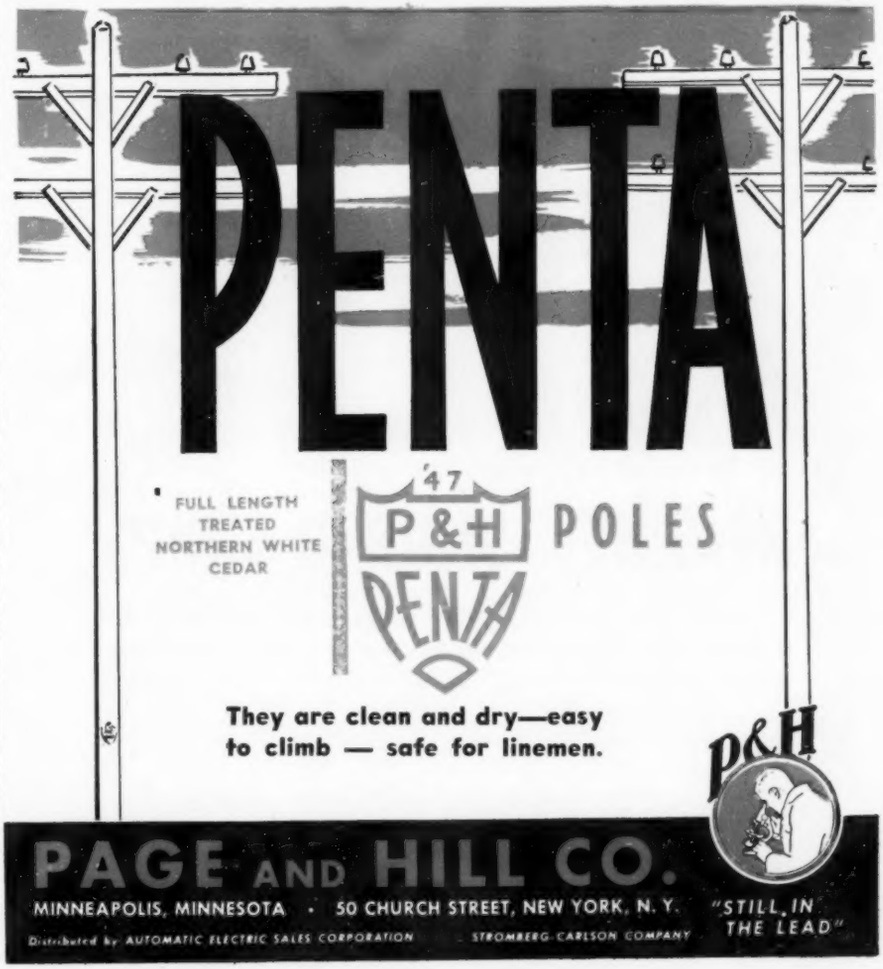

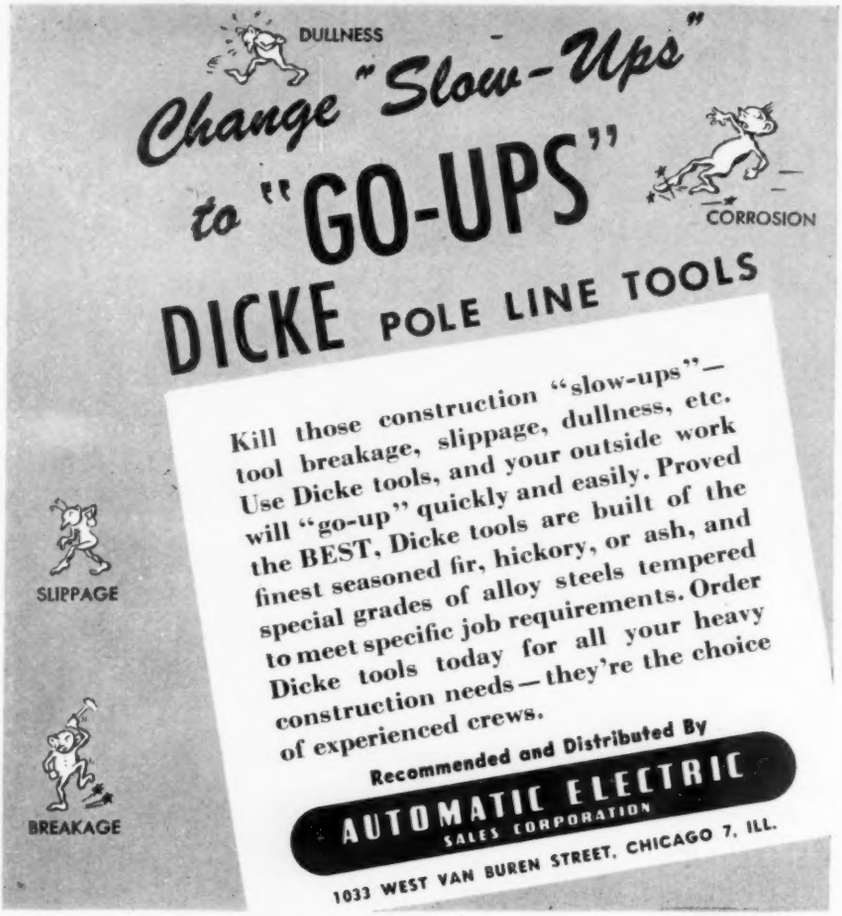
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Change "Slow-Ups"
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Kill those construction "slow-ups"—tool breakage, slippage, dullness, etc. Use Dicke tools, and your outside work will "go-up" quickly and easily. Proved the BEST, Dicke tools are built of the finest seasoned fir, hickory, or ash, and special grades of alloy steels tempered to meet specific job requirements. Order Dicke tools today for all your heavy construction needs—they're the choice of experienced crews.
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KEARNEY SNUB-R-GRIPS

This effective drop wire grip has amazing holding power through snubbing action, yet it does not damage the insulation. It's easy to take up or pay out slack after the grip has been installed by inching the wire through the grooved spiral. Snub-R-Grips are easily installed or removed.

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Overhead and Underground Utility Equipment

move gangs considerable distances between jobs, particularly in cold weather or storms.

In the designing of telephone truck bodies, compartments, ladder brackets and power equipment, every effort is made to so plan the details that the equipment will not only fit all current models of chassis but that it can be adapted to succeeding models with a minimum of change.

You have probably noticed a general trend in ½-ton chassis design which adds a complication to body mountings. Rear fenders have become more bulbous and longer to the rear, so that in many cases the conventional rear bumpers are so far back that they hold the workman too far away from the rear body doors for convenient use of the body. To meet this situation a special rear bumper is available for ½-ton chassis. It clears all types of rear fenders and does not interfere with access to the rear of the body.

The question of the best position for carrying ladders on the trucks, particularly the ½-ton trucks, has received considerable discussion during the years. Telephone companies generally favor the usual side mounting. One improvement of recent years is the new type holder and improved side brackets which permit the driver to release the ladder while he is in the cab and to open the left side door in case of emergency.

IT IS A PROVED fact that a well-equipped line construction truck is a good investment. With proper equipment, the line construction truck permits either aerial or underground construction work to be handled safely, quickly and at a much lower cost than possible when such equipment is not available.

The well-equipped line construction truck of today is provided with:

(a) Power winch.
(b) Power take-off.
(c) Power take-up reel.
(d) Nigger-head.
(e) Pole Derrick.
(f) Supporting jacks to relieve rear springs and tires when an extra heavy load is being handled on the derrick.
(g) Two-section safety extension ladder.
(h) Pike poles for lining poles after they have been set by the derrick.

MUCH THOUGHT has been given to the design of present-day installation truck bodies. Among the new features are sufficient storage space to carry under cover a normal

load of supplies and tools. The bodies have overhead ladder brackets to carry the extension ladder when not in use. This clears the driver's window, provides more freedom for the giving of hand signals and permits emergency exit through the doors in case of accident.

Space in the new bodies has been provided for drop wire reel, small step-ladder and a special shelf for the spare tire. On one model, the top is depressed 1 ½ inches and can be used to carry loads in emergencies or for tree trimmings.

Also incorporated in the new installation bodies are the following features:

(1) Rear compartment is accessible through two vertical doors and contains sliding apparatus trap with gravity latches to lock them in position while traveling.

(2) There are also compartment trays for small hardware and shelves for wire.

(4) Floor compartments are provided for tree trimmer sections, ground rods and other long equipment.

(3) Card holders showing material drawer layout for supplies is mounted in the inside of the right rear door.

(5) In the front compartment is space for the spare wire, drop wire reel, hand and docking saws, safety belts and climbers, and other materials.

(6) Small doors on both compartments enable the installer to load or unload his truck in less space than formerly.

Manufacturers have made considerable progress in providing the industry with specially designed installation and general service bodies.

Recently put on the market is an all steel unit for installing on ½-ton chassis of any standard make truck. Known as the "Telephone Maintenance and General Service Body", the unit embodies all the more modern features of truck body construction and is fabricated in a manner to eliminate all excessive weight. It is constructed of cold-rolled sheets, electrically welded into a single unit. Cast aluminum fittings are provided on the ladder racks in an effort to further reduce the weight of the entire unit.

All compartment doors are of waterproof construction for the protection of materials and tools which may be carried. Other features of this body are:

(1) Compartment arrangements are adaptable for both instal-

FOR YOUR CONSIDERATION

PINS FOR TELEPHONE CONSTRUCTION

The ever popular Hubbard Telephone Pins are styled to fit every telephone construction need. The drop forged pin bodies have clean, rolled threads and are heavily galvanized for protection against corrosion. Great care is taken in preparing the wood cobs which are properly seasoned, air dried and thoroughly impregnated with paraffin.

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† A. T. & T. COMPANY STANDARD

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And With Bashlin's, Men Think of the Job.

EQUIPMENT Safety is taken for granted with Bashlin's Original Rolled Edge Belts, Bantam Weight Climbers, Safety Straps, and other linemen's equipment. Why?

Experienced linemen know that for dependable service and safety equipment of the highest quality, Bashlin's is unequalled.

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lers and general maintenance operations.

(2) The unit can be equipped with 2-section extension ladders, hinged ladder rack assembly, wire reel, pintle hook, overhead spotlight, medical kit holder, tire carrier in body and heavy duty channel type rear bumper with safety tread steel step.

Also available is a newly developed all steel unit designed particularly for handling cable splicers' work. This unit is designed for installation on a ¾-ton or 1-ton truck chassis.

Containing an unusually large amount of compartment space which has been arranged so that all necessary items used in cable splicing work can be satisfactorily carried, provisions have been made in this body for transporting welding equipment, platforms with canvas enclosures, all hand tools and necessary tools for carrying out cable splicing operations.

THE POWER WINCH is a most important item of equipment. Preference has been shown toward a winch equipped with two drums: a large drum to hold at least 80 ft. of line for pulling in cable, and a small drum to hold about 200 ft. of line to handle heavy pulls.

If you're considering purchase of a winch, give consideration to the free drum feature. Unless the winch has this feature, the drum must be run to pay-out line. This procedure works the motor considerably on a long cable pull. The free drum feature permits paying out line by hand when a lever is pulled to operate the clutch attached directly to the winch. Over-running of the drum is prevented by the operation of the brake which is provided within the clutch and operated by the clutch lever. The drum cannot be released when under load which of course guarantees against release of the load except by power.

In erection of poles the modern construction truck proves its greatest value. A good pole derrick makes erection of ordinary poles up to 45 ft. into a simple job. When the job calls for erection of extra long poles, the derrick may be used to set the gin pole, and the winch provides ample controlled power for easy erection.

POPULAR AMONG TELEPHONE companies, all-wheel drive converted Ford trucks have proved in where the going has been really bad. These units have won their spurs in the industry because they are fast mov-

(*Please turn to page* 104)

Spring Construction Program

(*Continued from page* 43)

which rural joint use might well be applied. However, *this type of construction should be engaged in cautiously*, particularly by the smaller companies which may lack facilities for carefully installing and checking the safety features of rural joint plant.

In the writer's opinion, the high voltage hazards are greater on rural joint use construction than with separate pole lines on opposite road sides. However, these hazards can be minimized by proper installation and maintenance of adequate protective units. The Bell System rural joint use tests have shown that *current drainage networks* applied at intervals of two and one-half miles and special high current capacity arrestor blocks placed at one-half mile intervals will keep hazards at a minimum. Transpositions on every other pole are required to keep the induced power noise level down to a satisfactory level. Independent telephone companies interested in rural joint use are urged to write to the American Institute of Electrical Engineers, 33 West 39th Street, New York, N. Y., and obtain a copy (price 55c) of their recently published paper "Joint use of Pole Lines for Rural Power and Telephone Services". Among other things this paper expresses the opinion that "joint use in rural areas is feasible and offers certain economic advantages." The paper also discusses the results of rural joint use field trial experiments.

Design of Open Wire Plant

IN PLANNING a town or rural plant repair job some thought must be given to the feasibility of replacing heavy open wire circuits with cable. Cable offers the distinct advantage of greater freedom from storm damage, less inductive interference and better appearance. In general, where the circuit load is five or more pairs, cable can generally be used to advantage in town plant. A complete cable plant is particularly desirable for exchanges that are maintained from a distant point as fewer maintenance trips are usually required.

Care must be taken in planning the replacement of heavy open wire leads with cable if the circuits carried extend well out into a rural area. Cable can normally be extended as much as several miles from an exchange office to care for heavy rural feeder leads. If the distances involved are greater than this, the transmission should be carefully examined as cable has a much higher attenuation loss than open wire and if the lengths involved are substantial, large gauge loaded cable may be required.

When considering the replacement of existing open wire rural leads because of poor wire condition, or when planning for the addition of open wire rural circuits to take care of growth, do not overlook the possibility of special rural (not power line type) carrier systems being made available which can be applied directly to rural circuits to provide extra channels over existing wire lines. When such equipment is available there may be a need for low loss copper or Copperweld conductors on rural leads because of their superior performance with carrier circuits. (Single channel systems suitable for rural already available.) It is possible that a single pair of copper or Copperweld conductors may someday carry the entire circuit load for each rural lead.

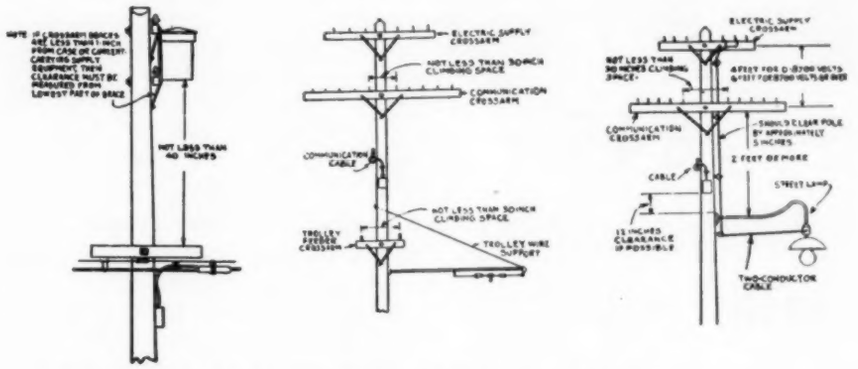


Fig. 4—Typical Joint Use Plant and Clearance Requirements.

Long Span Open Wire Construction

LONG SPAN open wire construction is nothing new in the telephone field as it has been successfully used for years. However, there are still some companies that have not taken advantage of the economy offered by such construction and may wish to include this type of plant in the summer construction program. Long span construction is not entirely suited to all areas but where the terrain is such as to make it feasible it is generally agreed that it offers a means of providing a lower cost rural distribution plant.

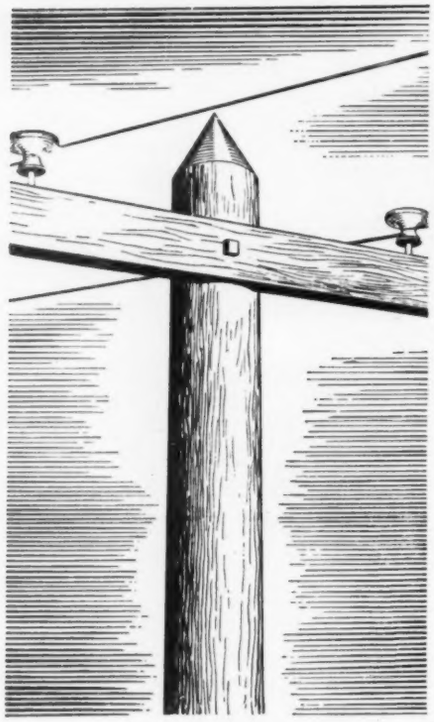
A recent innovation in rural construction is a new method of attaching pins to poles by drilling a hole at an angle of 60° from the vertical. An ordinary wood insulator pin is driven into the hole and held in place by 30-penny galvanized nail. Known as *pin socket* construction it is thought to be somewhat cheaper and better than bracket construction although opinion is divided on this point.

Other practices now being followed by some of the larger companies as a means of lowering rural construction costs, is the omission of guys at corners where the load is light. Slightly heavier poles are used at the corners and they are set one foot deeper than is normally the case.

Extra clearance is obtained between wires of a pair on long span construction by tying wires on the opposite side of the insulators. This results in 14-inch spacing which reduces the possibility of the wires swinging together in high winds.

Spiral preformed ties are being used to advantage on long span construction as a means of dampening out vibration thus reducing line wire breakage at insulators which normally results from wire fatigue and abrasive action. The use of special transposition brackets, consisting of two steel insulator pins mounted one foot apart on a steel bar and equipped with special double groove insulators, has simplified the placing of transpositions in rural circuits.

PROGRESS IN INSULATORS 2.



★ 1845 ★

Glass "bureau knob" insulators

EZRA CORNELL substituted a glass "bureau knob" insulator for the notched crossbars originally used. The wire was supported by wrapping around the knob shanks. This insulator worked better than glass plates, but it lacked mechanical strength and there was still leakage in wet weather.

One of the first manufacturers of insulators, Hemingray keeps pace with the requirements of modern communication circuits.

Write for the complete historical outline of insulator development.

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Owens-Illinois Glass Company
Hemingray Division, Muncie, Ind.

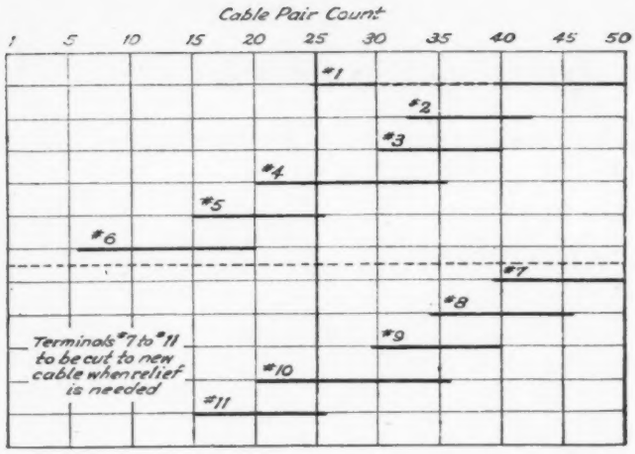


Fig. 5 — Arrangement of Cable Multiple to Permit Two Cables to be Later Cut Apart for Relief Purposes.

This fixture, while more expensive than the usual drop bracket or the nine-inch pin and special insulator, is nevertheless a time saver and will probably prove cheaper on the basis of annual charges. It permits the line wires to be pulled to proper tension without regard to transpositions, the wires can then be laid into the deep insulator grooves in such manner as to create what might be considered as a point transposition. This type of transposition is more effective in reducing noise than the rolling type of transposition.

Table four will be found useful in open wire considerations.

Planning the Cable Plant

AS A RESULT of war time restrictions on cable plant extensions, many Independent cable plants are now filled to capacity, and many potential subscribers clamor for service. Before undertaking any cable additions or replacements, for reasons of either capacity or poor condition of existing cable, a careful study should be made to determine whether existing cables are on *fundamental feed routes* and the most economical cable sizes to take care of existing and anticipated growth over a period of fifteen to twenty years. The practice of simply replacing congested cables with the next larger size is costly and unsatisfactory over a period of years. Proper planning for cable replacements requires preparation of a house count map; the working out of fundamental feed routes; an analysis of present terminal-line feeds; and a study of the present and anticipated pair requirements along the various distribution and feeder routes. This study should result in a definite plan for providing needed relief and adequate provision for future growth.

Relief of Existing Cable

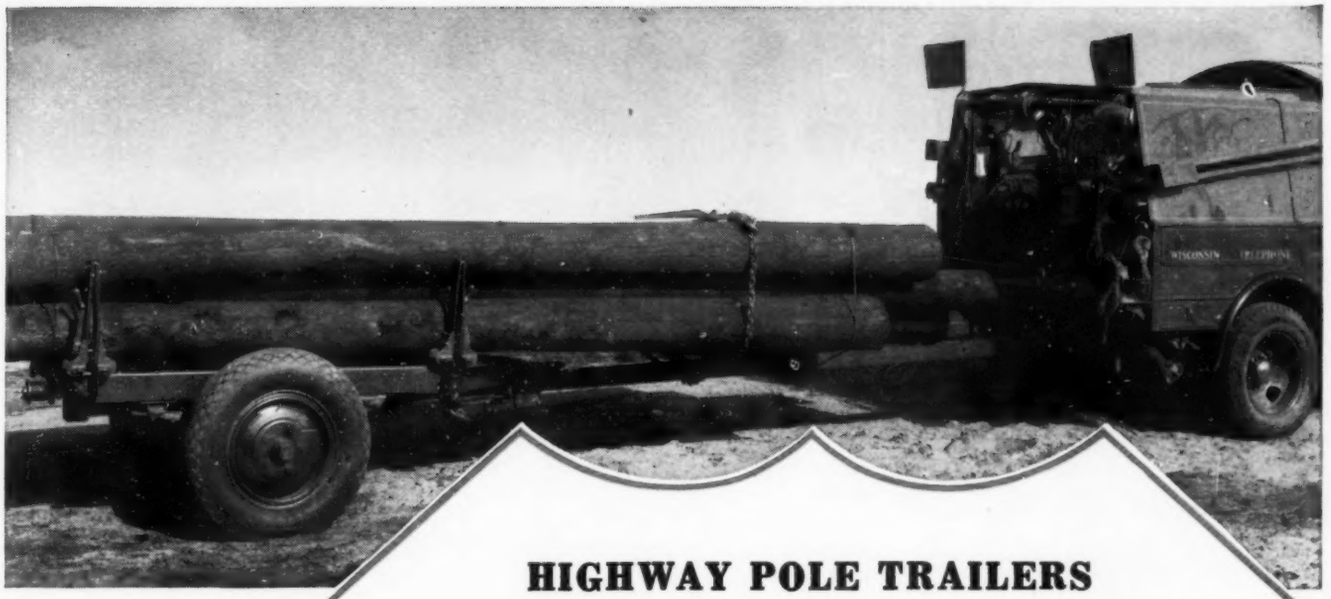
RELIEF OF existing congested cable can generally be cared for in one of three ways, namely: (1) by

(*Please turn to page* 100)

Table No. 4—Mechanical and Electrical Characteristics of Open Conductors

Type and Gauge	Diam. (in.)	Minimum Breaking Load (lbs.)	Wt. per Mile (lbs.)	Resistance per Mile (ohms)	db Loss per Mile
Hard drawn copper					
.165 (#8-BWG)	.165″	1326	435 lbs.	2.01	.035
.128 (#10-NBS)	.128″	830	264 lbs.	3.34	.052
.104 (#12-NBS)	.104″	550	172 lbs.	5.06	.073
Copperweld					
.128 (#8-AWG)	.128″	1660	242 lbs.	8.45	.119
.104 (#12-NBS)	.104″	1177	158 lbs.	12.92	.160
.064 (#14-AWG)	.064″	400	60 lbs.	34.00	.329
Iron or steel					
.109 (#12-BWG) Gr. 135	.109″	1213	170 lbs.	38.23	.313
.109 (#12-BWG) Gr. 85	.109″	793	170 lbs.	34.12	.303
.109 (#12-BWG) Gr. Steel	.109″	510	170 lbs.	39.71	.320
.109 (#12-BWG) Gr. BB	.109″	476	170 lbs.	34.12	.303
.109 (#12-BWG) Gr. EBB	.109″	425	170 lbs.	28.53	.295
.083 (#14-BWG) Gr. 85	.083″	460	99 lbs.	58.59	.390
.083 (#14-BWG) Gr. BB	.083″	275	99 lbs.	58.59	.379

*db loss—Wet Weather Values.



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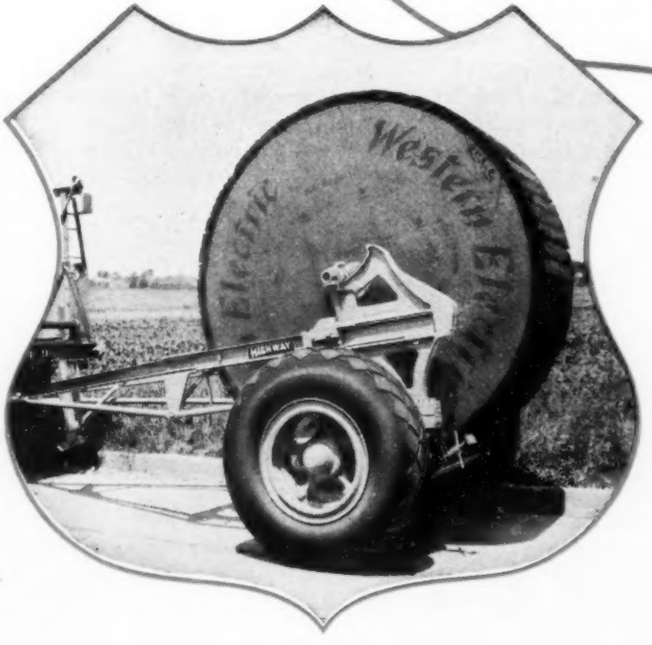

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Scenes similar to the one above will be common this spring and summer as the telephone industry attacks major construction projects.

replacement of the congested cable with a larger cable, (2) by reinforcement of the existing cable with a second cable, (3) by relief over a different route involving the cutting off some of the load from the old to the new route. A careful cost study of the several alternative methods is usually necessary to determine the method best suited to a particular situation.

The cable size selected for a particular route must take into account the immediate circuit load; the anticipated circuit growth over the study period which is usually from ten to fifteen years; and future relief plan. Helpful information as to probable growth trends in a given area can often be gained by conferring with the local gas or power companies relative to growth studies they may have made.

Advantage should be taken on new cable construction, where feasible, of the smaller gauge cables now available. Most small exchange cable plants which do not extend much beyond the city limits can use 24 gauge without exceeding transmission and resistance limitations. And for many situations 26 gauge cable will prove entirely adequate. With cable prices rising sharply due to high lead and copper costs, substantial savings can be effected by the use of 24 or 26 gauge in place of 22 gauge cable.

In laying out new cable plant or changes in existing plant, the help of an experienced engineer is desirable. Many Independent companies fail to take advantage of the economy and convenience of using a carefully worked out cable multiple arrangement. Cable plant can be designed with a smaller number of cable pairs than would otherwise be required by the proper use of multiple assignments. As an example of careful advance planning, Fig. 5 shows how two cables can be multipled together in such manner that they can later be cut apart to provide relief, yet, leaving each cable with its terminals properly spread across the count.

Present high cost of labor and material make it imperative that every construction superintendent be on the alert for new and improved methods which will help to reduce the cost of constructing and maintaining telephone plant. Every construction operation from hole digging to cable splicing can stand careful scrutiny and analysis to determine if the methods used are efficient with respect to time and material requirements, and long range maintenance considerations.

Hand versus power methods will bear careful comparison. An approach to the solution of lower construction and maintenance costs would seem to be in "powerizing" construction trucks. A number of hand operations which are time consuming and which tend to run up unit costs on various construction operations, could better be done with portable electrical tools. Such items as drilling, sawing, tool sharpening, etc. can certainly be done more economically by motor driven tools. Electrically driven augers for hole digging have already proved themselves.

"Powerizing" a construction or maintenance truck involves the installation of a portable 110 volt-60 cycle gas engine driven power plant, and the use of power tools in place of hand tools whenever possible. A 2500 watt capacity generator will supply ample power for most purposes.

Conclusion

CAREFUL PLANNING of telephone plant additions and changes will result in improved performance and lower "period costs." Every job of any size should be laid out on paper and all details carefully coordinated before construction work is started.

Construction costs should be kept to a minimum by the use of modern tools and materials carefully selected to meet the job requirements without waste in strength or capacity.—THE END.

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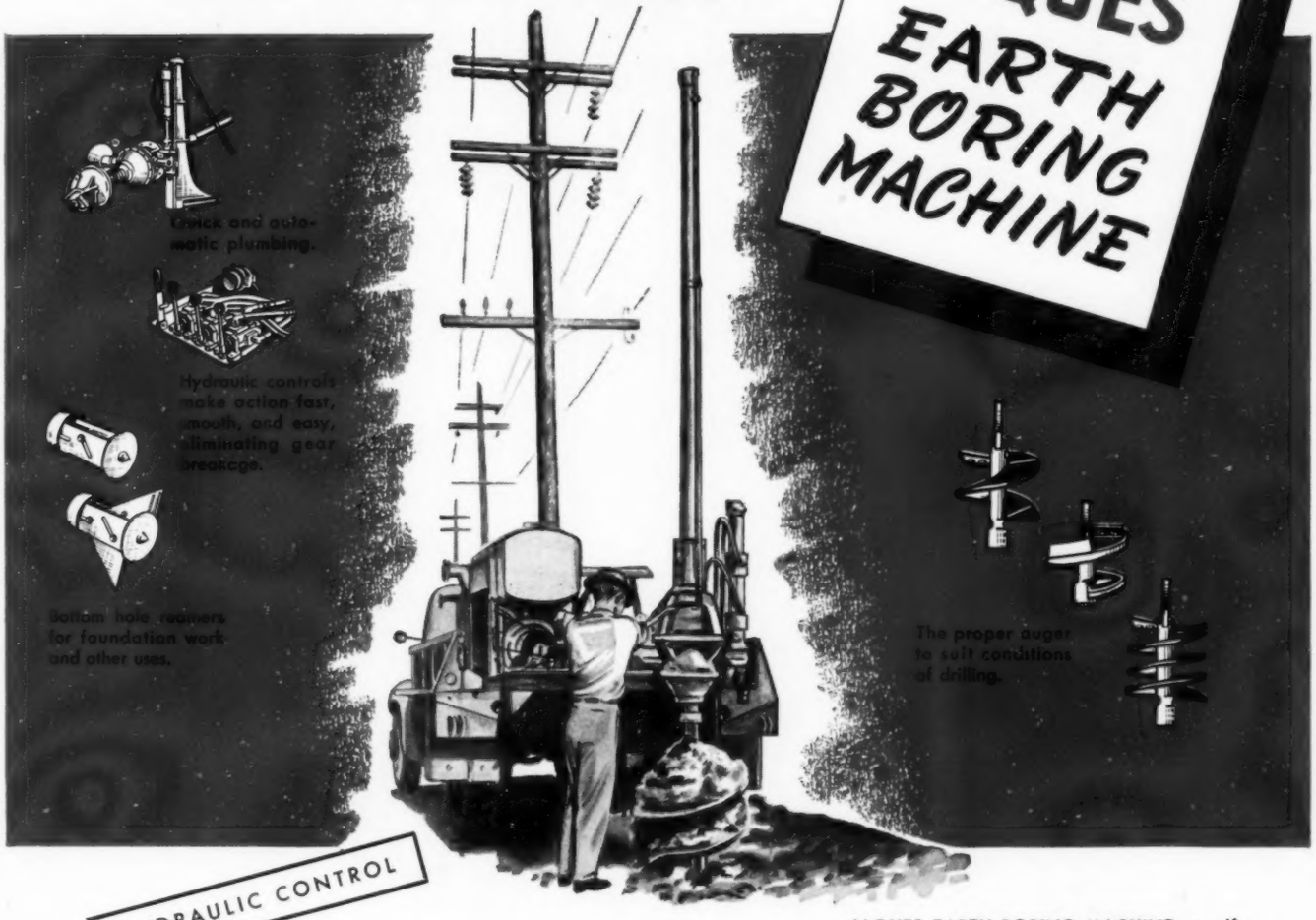
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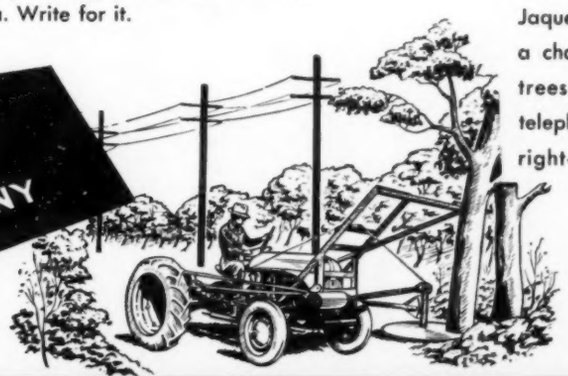

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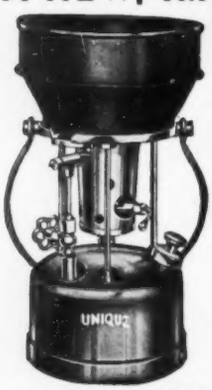

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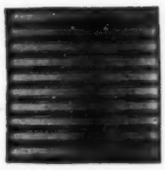

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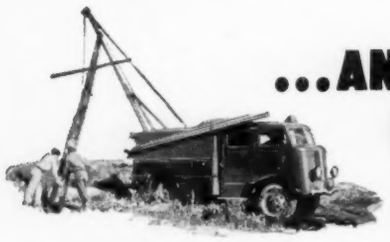

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Modern Truck Equipment

(*Continued from page 96*)

Another view of a Marmon-Herrington Ford conversion with earth boring equipment mounted on it.

ing, powerful and because they have power applied through all wheels. The records show that on the highway they give safety in positive steering and anti-skid action of four or six wheels grasping the road instead of two. Off the highway, these all-wheel drive units have set performance records, carrying normal loads through sand, dirt, mud or snow, and climbing grades.

The items reviewed in this article have necessarily been confined to relatively few of the automotive equipment now available. Sufficient has been said, however, to indicate the popular types of equipment and suggestions for determining how they may be utilized and your operations carried on more economically and more safely by reason of this equipment. Because of it not only a better but a cheaper service of supply is available.

In fact, not merely as a means of transportation, but also as a working tool, automotive equipment has become an integral, indispensable part of telephone operations. To maintain this high standard of usefulness, however, requires constant consideration since new problems, new economies and new methods of bettering the service are constantly arising.—THE END.

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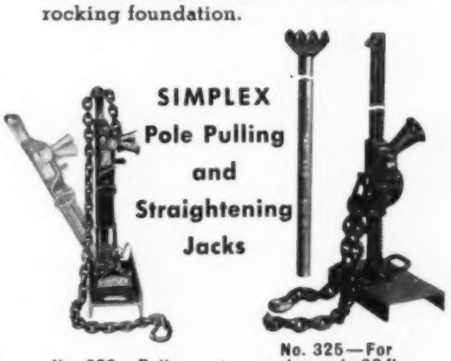

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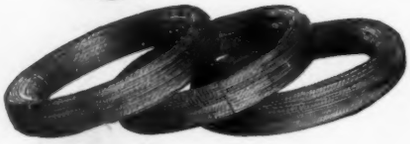

THE BACK OF THE BOOK

By JOHN G. REYNOLDS
Managing Editor

INVENTORS BEST AT 43 . . .

LIFE BEGINS at 40 for inventors so don't give up on that pet telephone idea of yours.

A recent study of 150 scientists' work revealed that more than half of 100 outstanding inventions were contributed by men past 36, while 35 per cent of the total were developed by inventors who had passed their 40th birthday.

"While sudden flashes of inventive genius may and often do occur among very young scientists, their most important and numerous contributions are made after they pass 30 and continue a steady climb until they reach a peak at age 43," the study revealed.

• • •

TROUBLE REPORTS . . .

YOU MEN on the test desks should get a chuckle out of this story of an insulation test which showed a high-resistance short, yet five hours later the trouble cleared up. Repairmen who hustled out to find out what was wrong, found a dead snake thrown across the wires near a cross arm in the vicinity. They finally decided that the snake, which had become damp from fog and dew during the night, must have been the culprit, and that the sun's rays had cleared up the trouble by drying out the reptile later in the morning.

In another case a certain wire would always be in trouble about three in the afternoon. The trouble was finally traced to cows, which collected near the gate of a pasture field and occasionally rubbed against a nearby guy wire.

• • •

SPARE THAT TEMPER . . .

OF INTEREST to you traveling telephone folks:—A Chicago hotel is trying out a plan to appease one type of indignant arrival. He's the traveler who finds that his reservation has gone to someone else—and he can't be accommodated. Now, before he gets to the desk-thumping stage, a beaming hotel employe slides up to him with a card in his hand. It's a reservation for a room in another, less-crowded hotel. Also pressed on him is a half-dollar: To pay his cab fare to the second hostelry.

• • •

TAX CHECKERS . . .

TAX CHECKERS turn up $20 for every $1 spent thumbing through returns, reports the Wall Street Journal.

The Treasury has 2,000 agents trying to catch errors in 80 million tax forms filed annually. Actually, they can audit only 18% of all returns and personally go after only 3% of the taxpayers.

Internal revenue officials fear cuts in their budget will cost money, not save it. They claim a proposed $30 million slash in their funds will mean the loss of $600 million in potential recoveries.

The experts say they find 50% of all returns they examine are wrong. Only about 2% are "willful" violations. The rest they generously attribute to bad mathematics.

The Government prosecutes in court fewer than 200 tax cases yearly. Most people pay up what they owe when notified.

• • •

KILROY MAKES DIRECTORY . . .

IN CONDUCTING a bit of directory research, a Cleveland (Ohio) Press reporter found that Kilroy was very much there—12 of him with telephones. As to other famous names, he found Steve Brody, Woodrow Wilson, W. G. Harding and Van Johnson.

There's a Richard Roe, but no John Doe; a John Corpus, but no habeas; 37 Finns but no Mickey; 36 Crosbys without a Bing, and 11 Trumans without a Harry.

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